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NACA

RESEARCH MEMORANDUM

A RESTRICTED LIST

of

AIRCRAFT MATERIALS RESEARCH PROJECTS

Sponsored by Government Agencies

NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS

WASHINGTON

May 4, 1948

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

A RESTRICTED LIST OF AIRCRAFT MATERIALS RESEARCH PROJECTS

FOREWORD

This list of active materials research projects sponsored by the Government has been prepared by the National Advisory Committee for Aeronautics and is a continuation of a series originated by the NACA Special Committee on Materials Research Coordination. The Special Committee on Materials Research Coordination has been discharged, but certain of the functions formerly assigned to that group are being continued by the staff of the Washington Office of the National Advisory Committee for Aeronautics.

This list contains a selected group of projects sponsored by the Government on materials having applicability to the field of aeronautics, and it supersedes a previous publication entitled "A Restricted Index of Aircraft Materials Research Projects Sponsored by Government Agencies," dated May 1946. It is distributed to Government agencies, the aircraft and related industries, to the producers and fabricators of aircraft materials, and to appropriate research laboratories in keeping with the Committee's policy of encouraging the greatest possible exchange of research information within the limits of security and proprietary considerations.

The objective of this list of projects is to indicate work currently in progress, and to elicit comment from those concerned with the utilization of aircraft materials as to desirable new projects or fields for exploration. Because most of these projects are still in progress, few formal reports have been prepared on them. Therefore, the NACA does not have more detailed information on many of the projects than that which appears in this list. The NACA will, however, be glad to cooperate on any requests for additional information which may be available.

There are included in this list many projects of general interest to the aircraft industry regardless of the end use to be made of the results of the projects. It is felt that research on materials can have applications in the field of aeronautics even if it is primarily concerned with a different field. Acknowledgment is made to the agencies sponsoring the projects for their cooperation in making the information in this list available.

This list should not be considered as a complete statement of Government sponsored research on aircraft materials, because research is continuously being initiated and completed. Also, some projects have been omitted because they were not considered of sufficient general interest to the aircraft industry. Further, in the interest of national security some investigations are maintained at a higher classification than "Restricted," and consequently are not included herein. The projects listed herein are either "Unclassified" or "Restricted."

The projects contained in this list are arranged according to alphabetical subject headings. Each project is listed only once and will be contained under that heading which best illustrates the basic material, process, or end use.

Comments and suggestions concerning this publication and the projects listed herein are welcome and may be directed to:

National Advisory Committee for Aeronautics
1724 F Street, Northwest
Washington 25, D. C.

Attention: Materials Research Coordination

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ADHESIVES

USE OF ADHESIVES FOR FABRICATION (Uncl.)

To develop strong, waterproof seams through the use of high polymeric compositions as bonding agents.

Sponsored by: Office of Quartermaster General
Conducted by: Goodyear Tire & Rubber Co., Akron, Ohio

FIELD USE OF ADHESIVES FOR FABRIC REPAIR (Uncl.)

To develop an adhesive compound which will be suitable as a bonding agent in the field repair of all Engineer equipment manufactured from coated or uncoated fabrics.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

NATURE OF ADHESION AND MECHANISM OF ADHESIVE ACTION (Uncl.)

To obtain a better understanding of the nature of adhesion and the mechanism of adhesive action so that adhesives for use in aircraft may be formulated on a more rational basis. The fourfold purpose is to (1) study bonding techniques, (2) develop suitable standard testing procedures for determining the engineering properties of bonded assemblies, (3) obtain data concerning the engineering properties of specific bonded assemblies, and (4) to obtain information which may be helpful in selecting the systems for the fundamental studies.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

PRELIMINARY EXAMINATION OF NEW GLUES FOR METAL AND PLASTICS (Uncl.)

In order that the properties of available glues can be known and to permit comparison of the adhesives, the laboratory has had a continuing project for making preliminary examinations of new glues for metals and plastics as they have appeared on the market. Such preliminary evaluation tests have followed the gluing technique recommended by the glue manufacturers and included determination of the dry joint strength, the initial water resistance, and the softening effect at elevated temperatures. Eight glues are now included in this study, and it is planned to include new glues as they may be developed and placed on the market.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

EVALUATION OF BOND STRENGTH AT ELEVATED TEMPERATURES - STRUCTURAL ASSEMBLY CEMENTS (Uncl.)

The objective of this project is to obtain data on the effect of elevated temperatures on the bond strength of metal-to-metal and metal-to-wood adhesives after exposure of the test specimens for various lengths of time from approximately one minute up to one hour.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

CORROSION OF PLASTIC BONDED JOINTS (METLBOND)(Uncl.)

This project covers the determination of the relative corrosion resistance of "Metlbond" adhesive bonded joints of eleven aircraft metallic materials.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

PROPERTIES OF JOINTS OF ELEVEN AIRCRAFT METALS BONDED WITH CYCLE-WELD METAL ADHESIVES (Uncl.)

Determine the effect of salt spray exposure on the shear strength of lap joints made with cycle-weld adhesive using eleven different aircraft metallic materials.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

P-61 PLASTIC TAIL BOOMS (Uncl.)

To investigate the applicability of sandwich type of Conlon faces and low density core material, assembled by Metlbond adhesive.

Sponsored by: U. S. Air Force
Conducted by: Narmco, Inc., San Diego, Calif.

METAL-TO-METAL AND METAL-TO-GLASS ADHESIVES (Uncl.)

To investigate comparable commercial and experimental materials with a view to determining original properties obtainable and effects of exposure to extreme temperatures, solvents, and so forth.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Picatinny Arsenal

TEST AND EVALUATION OF RIVETED AND CEMENTED METAL JOINTS (Uncl.)

The objective of this project is to determine by test the strength properties of composite riveted and cemented joints in comparison with riveted joints and cemented joints.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

INVESTIGATION OF ADHESIVES

Tests are being conducted on various commercial adhesives for bonding glass to rubber, for bonding labels, and for other uses.

Sponsored by: Army Chemical Corps
Conducted by: Army Chemical Corps, Edgewood Arsenal, Md.

CLEANERS, STRIPPERS, LUMINOUS MATERIALS AND MISCELLANEOUS COMPOUNDS

TESTING OF AIRCRAFT DEFROSTING FLUIDS (Uncl.)

The objective of this project is to investigate materials which may be used to remove ice from aircraft surfaces at temperatures below -10° C.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF NEW REQUIREMENTS FOR STEAM CLEANING COMPOUNDS (Uncl.)

The objective is to establish a high-temperature stability requirement in Specification C-152 for the purpose of ensuring procurement of material suitable for use in fired coil heaters. Additions and substitutions of chemicals including borates for silicates will be made to the formula and the resulting product tested for high-temperature stability.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

REFLECTION REDUCING COATINGS - APPLICATION TO INSTRUMENT COVER GLASSES (Uncl.)

The objective of the project is to determine the service stability of reflection reducing coatings.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF CORROSION RESISTING FINISHES FOR STEEL AND ALUMINUM CHEMICAL WARFARE AGENT TANKS (Uncl.)

The objective of this project is to develop satisfactory coatings for the interiors of aluminum and steel tanks which will resist the action of chemical warfare agents.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF RECOVERY OF CRESOL FROM C-86 COMPOUND (Uncl.)

The object of this project is to determine whether the cresol ingredients may be satisfactorily separated from used carbon stripping solutions.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

POLISH - DEVELOPMENT OF LOW TEMPERATURE STABILITY TEST (Uncl.)

The object of this project is to develop test methods to establish the low temperature stability of polishes in order that unstable materials will not be procured.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

QUALIFICATION TESTING TO ESTABLISH LIST OF ACCEPTABLE MATERIALS UNDER NEW SPECIFICATION STEAM CLEANER (Uncl.)

The objective is to determine conformance of samples submitted to NavAer Specification C-152 in order to establish qualification as satisfactory product.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

LUMINOUS MATERIALS (Uncl.)

Research toward the improvement of the intensity and persistance of luminous materials, specifically the phosphorescent pigments for application to dials and markers.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: E. I. DuPont de Nemours & Co.

FABRICS

MILDEW RESISTANCE OF TEXTILES (Uncl.)

To prevent loss of military textile materials from mildew and organic rot by the most effective and economical means.

Sponsored by: Office of Quartermaster General
Conducted by: Quartermaster Laboratory: Textile Research Laboratory, Philadelphia Quartermaster Depot

FIRE RESISTANT TREATMENTS OF TEXTILES (Uncl.)

Development of a permanent fire-resistant treatment for clothing, tentage, and equipage fabrics which will prevent afterflame and limit afterglow.

Sponsored by: Office of Quartermaster General
Conducted by: Textile Research Laboratory, Philadelphia Quartermaster Depot

DEVELOPMENT OF IMPROVED U.S.A.F. TEXTILE MATERIALS (Uncl.)

This project covers: (a) a study of new synthetic textile fibers such as Fiber A (acrolynitrite polymer), Vinyon N (acrolynitrite-vinyl chloride copolymer), high tenacity nylon, and so forth, to determine their suitability for various U.S.A.F. uses; (b) the application of new resins to fabrics to produce improved stability (shrinkproofing of wool) abrasion resistance, and strength; (c) the study of insulating properties of various fabrics and fibers to improve warmth of flying and cold weather clothing; and (d) the development of suitable coated fabrics to be used for protective clothing for personnel handling dangerous rocket fuels, such as fuming nitric acid.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

CORDAGE STUDIES (Uncl.)

Studies are being made of various factors affecting the properties of cordage. Physical properties, chemical structure, surface characteristics, diameter and shape of monofilament are being investigated as to their effect on the strength and resilience of cordage. Further studies will be made of the stresses developed in various sections of the monofilament as the cordage is flexed, twisted and stretched in an effort to develop fundamental principles of design that will enable the manufacturer to make tailor-made cordage to meet specific requirement.

Sponsored by: Office of Naval Research
Conducted by: Fabrics Research Laboratories

RESILIENCE OF TEXTILES (Uncl.)

In this research program the factor of resilience in fibers and its relation to finished fabrics will be studied.

Sponsored by: Office of Naval Research
Conducted by: Textile Research Foundation

FABRICATION METHODS

CASTING AND FORGING (Uncl.)

This project covers research on casting and forging processes and techniques on ordnance items, particularly gun tubes.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

DIE CASTING RESEARCH (Uncl.)

The properties of light metal alloy die castings have been investigated only to a limited extent. This project covers the investigations of some German die cast parts and a German die casting machine.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Frankford Arsenal

DEVELOPMENT OF ELECTRODES FOR WELDING HIGH STRENGTH ALUMINUM ALLOYS (Uncl.)

The objective is to investigate the possibilities of developing an electrode which will deposit a self-aging high strength alloy.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

STATIC AND FATIGUE TESTS OF RIVETED JOINTS (Uncl.)

To determine the strength, under static loads and alternating loads of riveted joints connecting sheets of the newer high strength aluminum and magnesium alloys and to develop a test to indicate the notch sensitivity of such joints. To obtain comparative data on the newer high strength aluminum and magnesium alloys under static and alternating loads and to evaluate the relative merits of the several alloys.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

ALUMINUM WELDING ROD DEVELOPMENT FOR THE MULTI-ARC PROCESS (Uncl.)

This project is primarily to develop filler metals of high strength and of an electropotential such that the heat-affected weld zones are suitably protected against corrosion.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Cornell Aeronautical Laboratory, Buffalo, N. Y.

INVESTIGATION OF SPOT WELDING OF PLATED LOW CARBON STEELS (Uncl.)

The investigation is to obtain data on the effect of coatings on the quality of spot welds of low carbon steels.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF THE BRAZING OF ALUMINUM ALLOY PARTS (Uncl.)

It is proposed to determine the possibilities of joining aluminum alloys by brazing in lieu of other methods.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF PROCESS FOR WELDING HIGH STRENGTH ALUMINUM ALLOYS (Uncl.)

The objective of this project is to evaluate the suitability of existing welding processes using welding methods such as gas, arc, and arc-in-inert atmospheres or combinations thereof.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

DETERMINATION OF TECHNIQUE FOR SEAM WELDING ALUMINUM ALLOY (Uncl.)

This project was established to obtain data to control the quality of seam welding process by means of appropriate specified requirements.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF A METHOD OF DRIVING ALUMINUM ALLOY RIVETS BY RESISTANCE HEATING AND PRESSURE (Uncl.)

The objective of this project is to determine the suitability for use on naval aircraft of a method of driving aluminum alloy rivets by resistance heating and pressure developed by Eastern Aircraft Corporation and to determine the advantages of this method as compared with conventional methods of riveting.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

TO STUDY FLASH WELDING OF STRUCTURAL ALUMINUM ALLOYS (Uncl.)

Determine the physical properties of flash welded joints in heat-treatable aluminum alloys which are welded in the O temper and given a solution heat-treatment after welding. A sufficient number of joints shall be welded and tested to determine whether or not this procedure is superior to flash welding the alloys in the heat-treated condition.

Sponsored by: U. S. Air Force
Conducted by: Rensselaer Polytechnic Institute

NEW WELDING AND BRAZING METHODS AND MATERIALS (Uncl.)

This project consists of investigating new welding methods, equipment and materials. Data will be obtained which will be used in the preparation of specifications and in the design of joints.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

FLUX, SOLDERING (Uncl.)

Research leading to the development of a noncorrosive soldering flux for universal applications suitable for use on fine wire 38-AWG.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Foster D. Snell, Inc.

IMPROVEMENT OF METAL CUTTING TECHNIQUE (Uncl.)

The objective of these studies is to determine the maximum rate of metal removal now possible with improved milling cutter designs so as to utilize the full capacity of the machines. To determine the factors affecting the cutting of metals, the forces applied during machining are being studied as a function of tool design and cutting speed. Detailed force-strain and time-force curves taken on various machine elements are being used in this investigation.

Sponsored by: Office of Naval Research
Conducted by: California Institute of Technology

HIGH-SPEED MILLING RESEARCH (Uncl.)

The purpose of this investigation is to study methods for improving cutting tools and machining techniques for cast ferrous metals. The milling of cast iron is being investigated by endeavoring to vary one factor at a time. These factors include: design, material, and heat treatment of the tool; dimensions of the cut, cutter speed, and work speed; and finally composition and physical properties of the material being cut. Further data are being collected on power consumption during milling operation, tool wear, tool life, and surface finish of piece being milled.

Sponsored by: Office of Naval Research
Conducted by: University of Michigan

DEVELOPMENT OF HELICOPTER METAL ROTOR BLADES (Uncl.)

Design and fabrication of all-metal rotor blades suitable for the Model XHJP-1 helicopter. Blades are to be fabricated of 4130 steel nose structure, aluminum alloy frames for the after structure, with the entire blade covered by 18-8 corrosion-resistant steel, all attached by Cycleweld bonding.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Prewitt Aircraft Company

HIGH STRENGTH ALLOY STEEL ARC WELDING ELECTRODES (Uncl.)

This project covers tests of welded joints made with alloy steel electrodes to obtain data on the physical properties of the joints.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

FERROUS ALLOYS

INVESTIGATION OF PROPERTIES OF STEELS AT INTERMEDIATE TEMPERATURES (Uncl.)

The development of elevated-temperature static and fatigue properties of certain high strength materials in the range of room temperature to 900° F.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

WELDING OF CORROSION-RESISTING STEELS (Uncl.)

A series of stainless-steel specimens of specially selected compositions will be arc welded. The specimens will be furnished to the National Bureau of Standards for testing and evaluation.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF HEAT TREATMENTS SUCH AS MARTEMPERING AND AUSTEMPERING (Uncl.)

It is proposed to obtain data on heat treatments such as martempering and austempering on which to base requirements for including in AN-QQ-H-201.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF STABILIZATION OF 18 Cr - 8 Ni CORROSION-RESISTING STEEL (Uncl.)

This project was established to determine the factors affecting the stabilization of 18 Cr - 8 Ni steels possessing titanium and columbium.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

MECHANICAL PROPERTIES OF METALS AT LOW TEMPERATURES (Uncl.)

The determination of tensile properties of various ferrous and nonferrous metals in the temperature range of 100° C to -188° C. Materials to be investigated include iron, copper, aluminum, nickel, brass, Dowmetal, and monel.

Sponsored by: Bureau of Standards
Conducted by: Bureau of Standards

A STUDY OF THE MECHANISM OF THE BORON EFFECT ON THE HARDENABILITY OF STEEL (Uncl.)

This project is a study of varying amounts of boron on the hardenability and other mechanical properties of steel.

Sponsored by: Bureau of Standards
Conducted by: Bureau of Standards

"SIZE EFFECT" ON THE FATIGUE STRENGTH OF SAE 4340 STEEL (Uncl.)

This project covers the determination of the effect of size of specimens on the fatigue strength of SAE 4340 steel. Specimens have been fabricated and tests are underway.

Sponsored by: U. S. Air Force
Conducted by: University of Illinois

STUDY OF THE EFFECT OF ISOTHERMAL HEAT TREATMENTS ON THE MECHANICAL PROPERTIES OF STEEL (Uncl.)

To make a thorough study of the possibilities of improvement in mechanical properties of steels through application of interrupted cooling and isothermal treatments.

Sponsored by: U. S. Air Force
Conducted by: Case Institute of Technology

FATIGUE PROPERTIES OF SAE 4340 STEEL (Uncl.)

This project is an investigation of the effect of overstress in fatigue on the fatigue life of heat treated SAE 4340 steel.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DETERMINATION OF HARDENABILITY OF LOW ALLOY STEELS (Uncl.)

A modification of the Jominy specimen, the Jominy L specimen, has been proposed for use with the low hardenability steels. Hardenability tests using both types of specimens will be run on six different steels and the results compared. The reproducibility of test results obtained will be investigated in cooperation with the SAE Iron and Steel Subdivision V. Investigations of other types of specimens, of the transformations and cooling rates in the specimens, and of means of calculating hardenability will be made, as necessary.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

FATIGUE STUDIES OF COMMERCIAL SURFACES (Uncl.)

In ordnance applications of ferrous metals subjected to high stress, or repeated loading, the effect of surface finish on fatigue life is of considerable importance. The purpose of this project is to study effect of commercial surfaces produced by hot rolling, forging, cold finishing, vapor blasting, shot peening, and so forth, on the fatigue limit of steel plate.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

HARDENABILITY OF STEEL (Uncl.)

The purpose of this project is a study of the influence of alloying elements, carbon content and grain size on hardenability.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

FRACTURE CHARACTERISTICS OF METALS (Uncl.)

The purposes of this project are as follows:

a. To study the factors that influence the fracture characteristics of metals, particularly steel.
b. To study in the initial stages of this research the mechanism of temper brittleness, of the transformation that causes temper brittleness and the mechanism of its effect on the toughness of steel.
c. To study those related problems regarding fracture that will contribute to improving the ductility of metals with the understanding that the first improvement may be that of reducing temper brittleness.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Pennsylvania State College

TEMPER BRITTLENESS INVESTIGATIONS AND STUDIES (Uncl.)

This project represents supplementary studies relating specifically to temper brittleness in steel divided into the following phases:

a. Development of improved test for temper brittleness.
b. The effect of composition on temper brittleness.
c. The kinetics of temper embrittlement.
d. The nature of temper embrittlement.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

GENERAL RESEARCH AND DEVELOPMENT ON COLD EXTRUSION OF STEEL (Uncl.)

The purpose of this project is to determine the properties that can be expected using various steel compositions and auxiliary heat and surface treatments.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Heintz Manufacturing Company

THE EFFECT OF TITANIUM AND VANADIUM ON PHYSICAL PROPERTIES AND WELDABILITY OF HIGH TENSILE STRUCTURAL STEEL. (Uncl.)

Specifications for "High Tensile Steel Plate," of the manganese vanadium and the manganese-titanium variety, permit a fairly wide variation in composition and properties both of which may affect the weldability of these types of steel. A study is being made to determine the effect of physical properties and of various compositions on the weldability of these steels.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

THE CAUSES OF TEMPER BRITTLENESS IN ALLOY STEELS (Uncl.)

The purpose of this investigation is to determine the causes of temper brittleness in steels. It is known that several of the common alloying elements tend to increase susceptibility, and that plain carbon steels do not exhibit the characteristics of temper brittleness.

Sponsored by: Office of Naval Research
Conducted by: University of California

AN INVESTIGATION OF THE FUNDAMENTAL CRITERIA FOR SELECTING STRUCTURAL METALS (Uncl.)

The purpose of this study is to develop criteria more rational than those now in use, for selecting steels and other metals for specific structural and mechanical applications. These criteria are to be based upon the relation between physical properties of the metals as indicated by small-specimen tests and the behavior of structural and machine elements under service conditions.

Sponsored by: Office of Naval Research
Conducted by: University of Illinois

EFFECT OF ALLOYING ELEMENTS ON THE IMPACT PROPERTIES OF QUENCHED AND TEMPERED STEELS (Uncl.)

The principal objective of this work is to establish whether alloying elements have any effect on the temperature of transition from ductile to brittle fracture other than their influence on the hardenability of the steel.

Sponsored by: Office of Naval Research
Conducted by: Armour Research Foundation

PHYSICAL CHEMISTRY OF STEEL MAKING (Uncl.)

The kinetics of the chemical reactions that are involved in the making of steel are being studied. This includes a determination of the rates of reaction and the chemical species of the reactants in the slag-metal reactions.

Sponsored by: Office of Naval Research
Conducted by: Carnegie Institute of Technology

HYDROGEN EMBRITTLEMENT (Uncl.)

In this investigation the diffusion of hydrogen through metals is being studied as a function of the microstructure, stress, and surface characteristics of the metal. The influence of the composition of electroplating baths and addition agents on the diffusivity of hydrogen through metals is being investigated. Methods of heat treatment to avoid hydrogen embrittlement will be developed.

Sponsored by: Office of Naval Research
Conducted by: Carl A. Zapffe Laboratories

THE EFFECT OF STRAIN ON HARDENING OF STEEL (Uncl.)

This project is an investigation of the function of strain in the austenite-martensite reaction. The basic objective is to provide fundamental information which will lead to a fuller understanding of the hardening of steel.

Sponsored by: Office of Naval Research
Conducted by: Massachusetts Institute of Technology

PHYSICAL CHEMISTRY OF STEEL MAKING (Uncl.)

The reaction of liquid steel with gases containing steam and hydrogen will be investigated. The reaction of pure molten iron at temperatures of 3000° F and above will be studied to obtain more accurate data for the application of thermodynamics to steel-making. The effects of alloy elements, namely, vanadium and silicon, on the reactions will then be observed.

Sponsored by: Office of Naval Research
Conducted by: Massachusetts Institute of Technology

RESEARCH AND DEVELOPMENT OF SUBSTITUTES FOR CADMIUM AND ZINC PLATE (Uncl.)

A literature survey discovered metals other than cadmium and zinc which showed superior performance with respect to potential measurements.

This project will complete the present work now in progress and additional work as follows:

(1) Accelerated corrosion tests "wet-dry program."
(2) Measurements of electrode potentials of other alloys.
(3) Investigation of electrodeposition of most promising alloys.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

FUNDAMENTAL PROJECTS ON PROPERTIES OF MATERIALS

PLASTIC DEFORMATION OF SOLIDS (Uncl.)

This project is an investigation of the mechanism of plastic deformation in metal single crystals. To date the work has followed two lines: One procedure consists of a simultaneous measurement of the logarithmic decrement at known strain amplitude and at the initial creep rate under known load, and of the electrical resistance of a pure-metal single crystal. The second phase has been directed to the theory that imperfections responsible for plastic flow are produced during a deformation, with the imperfections originating at regions of stress magnification.

Sponsored by: Office of Naval Research
Conducted by: Carnegie Institute of Technology

PHYSICS OF METALS (Uncl.)

This program represents an intensive effort to further the understanding of the mechanism of deformation in metals, and thereby to lay a scientific foundation for further improvement in the mechanical properties of materials. The approach has been simultaneously directed along three lines: (a) the macrobehavior approach, (b) the microbehavior approach, and (c) the atomic reaction approach.

Sponsored by: Office of Naval Research
Conducted by: University of Chicago

DYNAMIC, ELASTIC, AND PLASTIC PROPERTIES OF MATTER (Uncl.)

This is a study of the dynamic, elastic, and plastic properties of matter. The objective is to improve experimental methods now in use and to develop new methods for the investigation of the elastic and plastic properties of solid matter. Materials to be investigated include natural and synthetic rubber, and various metals.

Sponsored by: Office of Naval Research
Conducted by: Cornell University

THEORETICAL STUDY OF THE APPLICATION OF PHYSICS OF SOLIDS TO AN UNDERSTANDING OF THE BEHAVIOR OF MATERIALS UNDER STRESS (Uncl.)

A study is being made of the use of rate-process and dislocation theory to explain stress-rupture, creep, and fatigue.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: NACA, Cleveland, Ohio

THE EFFECTS OF STRESS CONCENTRATION AND TRIAXIALITY ON THE PLASTIC FLOW OF METALS (Uncl.)

The purpose of this project is to find the solution first for the distribution of stresses and plastic strains in simple geometrical forms and later for more intricate cases. A determination is to be made as to the effect of the stress state (biaxial and triaxial), strain gradients, stress concentration, temperature, strain rate, and size effect.

Sponsored by: Office of Naval Research
Conducted by: Case Institute of Technology

DIFFUSION IN STRESSED METALS (Uncl.)

It is planned in this program to study the rate of diffusion of copper atoms through copper, and zinc atoms through zinc when these metals are placed under simple tension and compression. Measurements of the relationship between diffusion rate and strain within and beyond the elastic limit will be made at various temperatures.

Sponsored by: Office of Naval Research
Conducted by: Stevens Institute of Technology

THE FRACTURE OF METALS (Uncl.)

The objective of this investigation is to complete a literature survey on the factors which determine the ductility of metals in service. The proposed survey is to cover the distribution of deformation in structures loaded to failure.

Sponsored by: Office of Naval Research
Conducted by: Pennsylvania State College

STRESS AND STRAIN DEVELOPMENT IN PARTIALLY PLASTIC DEFORMED BODIES (Uncl.)

This investigation is a study of the behavior of metals in the region of strain between elasticity and full plasticity with particular emphasis on the states of multiaxial stress. The effects of small plastic strains on residual stresses present in cylinders before straining, the effect of variations in metal strength on stresses after small amounts of plastic deformation, and the effect of stress state on fracture conditions is being investigated.

Sponsored by: Office of Naval Research
Conducted by: Case Institute of Technology

THE EFFECT OF ELECTRON SHARING AND INTER-METALLIC COMPOUND FORMATION ON CORROSION OF METALS (Uncl.)

The purpose of this study is to further our understanding of how metals resist corrosion. An investigation will be made of the fundamental factors relating to electron-sharing and compound formation in several of the binary and ternary alloys in order to initiate a science of alloying with respect to chemical properties of metal systems.

Sponsored by: Office of Naval Research
Conducted by: Massachusetts Institute of Technology

STRUCTURE AND SOLUBILITY (Uncl.)

The purpose of this investigation is to examine the structures of the important metallic carbides and to determine the phase diagrams of a number of the binary, and possibly some ternary, combinations of carbides in order to provide a better understanding of the basic principles underlying such structures and a better practical utilization of their unique properties.

Sponsored by: Office of Naval Research
Conducted by: Massachusetts Institute of Technology

FUNDAMENTAL STUDIES OF CORROSION (Uncl.)

This study is designed to develop information on why metals and alloys corrode or do not corrode. The formation of protective films (passivation) on most metals makes possible the successful use of these metals under corrosive conditions at normal and elevated temperatures. Breakdown of these films results in corrosion failures.

FUNDAMENTAL STUDIES OF CORROSION (Uncl.) (Concl.)

The formation, breakdown, and nature of these films formed during the corrosion of metals at normal and elevated temperatures is being investigated including the study of the difference between active and passive resistance, the reason for pit corrosion, the mechanism of film formation, and the molecular and mechanical structure and porosity of films. Electron diffraction and X-ray diffraction techniques are being used.

Sponsored by: Office of Naval Research
Conducted by: Ohio State University Research Foundation

SPECIAL INVESTIGATION OF THE PLASTIC DEFORMATION OF SINGLE CRYSTALS OF LEAD OVER A RANGE OF TEMPERATURE (Uncl.)

To secure stress-strain curves, creep data, and elastic constants for single crystals of pure and commercial lead. These data are to be obtained over a range of temperatures. The single crystals are being grown in vacuum by the Bridgman method. Creep data will be obtained using a Tuckerman optical strain gage with additional amplification if it is feasible.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: Carnegie Institute of Technology

PHOTOELECTRIC WORK FUNCTIONS OF METAL SINGLE CRYSTALS (Uncl.)

A study is being made of work functions of metal single crystals and of methods for obtaining uncontaminated surfaces. The research involves: (1) determination of the work functions of metal single crystal faces, both before and after deposition of an evaporated film; (2) an examination of the film structure and surface planes by electron diffraction; and (3) a study of the closely related problem of the dependence of the work function of a metal film on the supporting backing and its correlation with film orientation as determined by electron diffraction methods.

Sponsored by: Office of Naval Research
Conducted by: Brown University

KINETICS OF REACTIONS IN THE SOLID STATE (Uncl.)

The purpose of this investigation is to study the mechanism of reactions in the solid state by means of radioactive tracers. A better understanding of the kinetics of diffusion will be obtained from measurements of surface diffusion coefficients as well as from volume diffusion data.

Sponsored by: Office of Naval Research
Conducted by: Carnegie Institute of Technology

DEVELOPMENT OF A RAPID METHOD FOR PREDICTION OF CREEP PROPERTIES OF A METAL FROM A KNOWLEDGE OF CERTAIN PHYSICAL CHARACTERISTICS (Uncl.)

The fundamental relationships between stress, strain, strain rate, and temperature are being studied in conjunction with an investigation of the prediction of creep behavior from the fundamental properties of the crystal lattice.

Sponsored by: Office of Naval Research
Conducted by: Massachusetts Institute of Technology

DETERMINATION OF FUNDAMENTAL FATIGUE CRITERIA WITH REFERENCE TO RANDOM LOADINGS (Uncl.)

To evaluate the relative values of the various theories concerning the accumulative effect of randomly varying stresses, or of the various methods of representing such randomly varying stresses; to apply the results of this evaluation to the development of adequate means for obtaining operational flight-load data applicable to the fatigue problem.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: NACA, Langley Field, Va.

BEHAVIOR OF METALS UNDER REPEATED STRESS (Uncl.)

The objective of this investigation is to study the behavior of metals under repeated stress and the factors influencing fatigue strength. Such factors include state of stress, range of stress, stress gradients, overstressing and understressing, residual stresses, size effect, strain hardening, temperature, and metallographic constitution. Analytical studies will be combined with a comprehensive laboratory program involving metallurgical factors as well as stress and geometry. Small and full-scale testing will be correlated.

Sponsored by: Office of Naval Research
Conducted by: University of Illinois

RESEARCH ON THE FATIGUE PROPERTIES OF MATERIALS AND STRUCTURES USED IN AIRCRAFT (Uncl.)

The development of information pertinent to the estimation of damage from repeated stresses. Materials to be investigated include:

(1) 75S-T Alclad sheet
(2) 24S-T hot-rolled rod or extrusions
(3) SAE 4130 steel

More extensive information on the notch sensitivity of materials will be sought and a study will be made of applications of fundamental principles to composite structures.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: Battelle Memorial Institute

HIGH TEMPERATURE MATERIALS

Metallic

INVESTIGATION OF PRECISION CASTING METHODS (Uncl.)

The objective of this project is to determine the variables affecting the properties of precision castings and to establish methods for their control. Effect of pouring temperature, mold temperature, and other variables on the properties of precision cast high temperature alloys will be determined. A set of 12 percent chrome compressor blades will be made for test in service.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

SERVICE TESTING OF HIGH TEMPERATURE MATERIALS IN SUPERCHARGERS AND GAS TURBINES (Uncl.)

The objective of this project is to evaluate new high temperature materials for jet engines under simulated service conditions.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

THEORETICAL STUDIES OF MATERIALS FOR EXTREMELY HIGH TEMPERATURE APPLICATION (Uncl.)

The objective of this project is to arrive at one or more fundamental working hypotheses for the behavior of alloys at high temperatures, as a preliminary to establishing laboratory investigations at a later date.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Pennsylvania State College

TESTING OF HIGH TEMPERATURE MATERIALS (Uncl.)

The objective of this project is to obtain the high temperature properties of heat resisting materials and to establish the necessary equipment therefor.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EXPLORATION OF THE CHROMIUM-TITANIUM BINARY ALLOYS (Uncl.)

The chromium-titanium alloy system will be studied by making a series of exploratory heats for metallographic examination.

Sponsored by: U. S. Air Force
Conducted by: Ohio State University

STUDY OF INTERGRANULAR DETERIORATION OF 16-25-6 ALLOY AT HIGH TEMPERATURE (Uncl.)

The cause of intergranular attack will be investigated on production and laboratory melts.

Sponsored by: U. S. Air Force
Conducted by: Ohio State University

STUDY OF STATIC AND DYNAMIC CREEP OF HIGH TEMPERATURE ALLOYS (Uncl.)

The stress-rupture and creep characteristics of the alloys currently used in gas turbine wheels and buckets will be determined when the loading consists of a static tensile load and a superimposed cycle of tension-compression.

Sponsored by: U. S. Air Force
Conducted by: Syracuse University

INVESTIGATION OF CONSTITUENTS AND STRUCTURE OF SEVERAL HEAT-RESISTING ALLOYS FOR GAS TURBINES (Uncl.)

Materials, structures, and constituents are being studied by X-ray diffraction techniques, electron diffraction, optical microscopy, and microchemical analysis. The X-ray diffraction studies include structural changes taking place at high temperatures.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: NACA, Cleveland, Ohio

EVALUATION OF HEAT-RESISTING ALLOYS FOR JET-ENGINE AND GAS-TURBINE APPLICATIONS (Cl.)

The objectives of this project are: (a) correlation between laboratory and engine tests with the possibility of determining what laboratory tests are important and needed; (b) evaluation of materials for operation at current temperatures and at higher temperatures than are currently specified; and (c) evaluation of materials which permit the conservation of critical alloying elements without sacrifice in engine performance.

Sponsored by: National Advisory Committee for Aeronautics, U. S. Air Force, and Navy Bureau of Aeronautics
Conducted by: NACA, Cleveland, Ohio

CREEP OF METALS (Uncl.)

The purpose of this project is to determine the relation between high temperature tensile properties and the creep behavior of metals.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

DEVELOPMENT OF ZIRCONIUM ALLOYS (Uncl.)

The project will be directed toward the development of zirconium alloys and evaluation of their properties with reference to their applicability to aircraft. Particular emphasis will be placed on alloys which have good high temperature properties for possible use on jet propulsion engines and guided missiles.

Sponsored by: U. S. Air Force
Conducted by: Bureau of Mines

DEVELOPMENT OF ISOELASTIC ALLOYS (Uncl.)

The object of this project is to investigate the elasticity of a new alloy system, Fe-Co-Cr, which has been reported to have a lower thermal coefficient of expansion than Invar. Methods of working these alloys will be developed and the effects of heat treatment and composition on the value of Young's modulus, torsion modulus, and thermal expansion will be studied. Other physical properties (magnetic, crystal structure, etc.) will be determined and correlated with expansion and modulus of elasticity.

Sponsored by: Office of Naval Research
Conducted by: Naval Research Laboratory

COMPILATION OF PROPERTIES OF STRUCTURAL MATERIALS AT ELEVATED TEMPERATURES (Uncl.)

This project consists of gathering and compiling data pertinent to this subject from AMC, other Government Agencies, educational institutions, and industrial organizations reports. Metallic materials, such as aluminum and magnesium base alloys and the complex alloys of nickel, chromium, cobalt, and iron will be reviewed. These data will be compiled principally in graphic form.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

FUNDAMENTAL INVESTIGATION OF HEAT RESISTING ALLOYS (Uncl.)

The purpose of this study is to determine the metallurgical and physical principles governing the behavior of heat-resistant alloys, particularly cobalt-chromium systems. It will include in its general scope: (1) the preparation of phase diagrams of alloy systems; (2) effect of fundamental metal properties, such as crystalline structure, grain size, precipitated phases, and heat treatment; (3) statistical studies of the effect of chemical composition of alloy systems; (4) study of factors influencing the weldability; and (5) presentation of engineering test data on currently known and available heat-resistant alloys for use by engineers to establish safe operating limits for the increasingly high requirements of gas turbine and jet propulsion service.

Sponsored by: Office of Naval Research
Conducted by: Battelle Memorial Institute

[redacted]

CEMENTED CHROMIUM BORIDES (Uncl.)

In this investigation, the equilibrium diagram for the Cr-B, Ni-Cr-B, and Co-Cr-B systems will be established. Only those portions of the diagram that will be useful in the development of heat-resistant materials will be carefully studied. The solubility of the chromium boride compound in nickel and cobalt, and the physical and mechanical properties of the various chromium borides will be studied for its effect on the behavior of the cemented compacts at elevated temperatures.

Sponsored by: Office of Naval Research
Conducted by: American Electro Metals Corp., Yonkers, N. Y.

KINETICS OF CORROSION REACTIONS AT HIGH TEMPERATURES (Uncl.)

The object of this project is to determine the kinetics of reactions of metals with gases at high temperatures including: development of suitable techniques, determination of the order of the reaction, mechanism of the reactions, and correlation of heats of vaporization and reaction rate.

Sponsored by: Office of Naval Research
Conducted by: Illinois Institute of Technology

EQUILIBRIUM CONDITIONS IN ALLOY SYSTEMS PERTINENT TO HEAT-RESISTING ALLOYS (Uncl.)

This project consists of the determination of the following in the Co-Cr-Ni alloy systems:

1. Solid phases of the system.
2. Coexistence relations among the solid phases.
3. Liquidus and solidus surfaces.
4. Temperatures of nonvariant equilibria.
5. Solid solubilities.
6. Nature of phase transformations.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: University of Notre Dame

THEORY OF DEFORMATION AND PLASTIC FLOW OF METALS AS APPLIED TO HEAT-RESISTING ALLOYS USED IN JET AND GAS TURBINE ENGINES (Uncl.)

This project is based on the premise that there is a definite need for metallurgical research which will give understanding of the causes for wide variations in the high-temperature properties of wrought alloys currently used in gas turbines or which may be required in the future to withstand higher operating temperatures.

THEORY OF DEFORMATION AND PLASTIC FLOW OF METALS AS APPLIED TO HEAT-RESISTING ALLOYS USED IN JET AND GAS TURBINE ENGINES (Uncl.) (Concl.)

Work is being conducted on a representative low-carbon alloy, N155, to determine the effects of varying the heat treating and processing procedures. The effects of varying the composition of the alloying elements and heats will be studied. Fundamental metallurgical studies will be made using chemical separations, X-ray diffraction, electron microscope and electron diffraction, and thermal analyses.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: University of Michigan

RESEARCH ON HIGH-TEMPERATURE SHEET MATERIALS (Uncl.)

A development of heat resisting alloys in sheet form which are superior to present sheet material in physical properties at elevated temperatures, applicable to turbo jet, ram jet, rocket, and other high-temperature uses.

Sponsored by: U. S. Air Force
Conducted by: Allegheny Ludlum Steel Corporation

INVESTIGATION OF THE EFFECT OF ATMOSPHERE REACTION ON DETERIORATION OF METALS AT HIGH TEMPERATURES (Uncl.)

The purpose of this investigation is to seek basic information on atmosphere reactions with metals and the effect of such reactions on the deterioration of metals when stressed at elevated temperatures. Stress-corrosion tests are being conducted and metallographic studies are being made to determine the effects of stress and atmosphere composition upon the structure of the metal. Intergranular weakening of metals at high temperatures are being studied in detail, and tests are being conducted in inert atmospheres and in various environmental atmospheres in which heat-resisting alloys are commonly used.

Sponsored by: Office of Naval Research
Conducted by: Stanford University

ZIRCONIUM ALLOY RESEARCH (Uncl.)

A laboratory investigation and research relative to the preparation and evaluation of zirconium-rich, binary and ternary, alloys of tungsten, molybdenum, and nickel. Laboratory studies will be made of the high-temperature strength properties, chemical corrosion properties, physical structure, and workability of the most promising alloys. Evaluation of the most promising alloys by tensile, creep, and fatigue testing will be conducted by the Air Materiel Command.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

[redacted]

Ceramic

GRAPHITE AND SILICON CARBIDE MIXTURES (Uncl.)

Ceramic bodies are being developed for use as gas turbine components and utilizing: graphite and silicon carbide mixtures; fused alumina and silicon carbide; euhedral corundrum and clay; kyanite, clay, and topaz; clay and aluminum metal; zirconia and aluminum metal; fused aluminum metal; fused alumina and lumnite cement; and beryl type bodies. Studies of ceramic coatings used in high temperature areas include: heavy metal silicate types for various alloys, and measurement of heat transfer, reflectance, and emissivity characteristics.

Sponsored by: U. S. Air Forces
Conducted by: New York College of Ceramics

METAL BONDED OR CEMENTED REFRACTORY OXIDES, SILICATES, AND CARBIDES (Uncl.)

Ceramic compositions for gas turbine blades are being developed to achieve longer life and higher operating temperatures with studies of: metal bonded or cemented ceramic oxides, silicates, and carbides; the metal bonded specimens made by the powder metallurgy technique and by vapor phase impregnation and/or capillary intrusion of the molten metallic phase into pre-fired ceramic bodies. The application of ceramic coatings to rotor blades is also being studied. Investigation of ceramic materials for combustion chamber liners include: solid ceramic segmental rings; metal wire reinforced ceramic coatings; and ceramic coatings, with emphasis on metal-bonded ceramic types. Ceramic coatings and solid bodies are being applied to obtain rocket motors that will withstand temperatures of 5300° F and 350 psi pressure for $1\frac{1}{2}$ minutes or longer. Physical data are being compiled on promising ceramic materials now known and a ceramic gas turbine rotor is being designed.

Sponsored by: U. S. Air Forces
Conducted by: Ohio State University Research Foundation

PROPERTIES OF SPECIAL COMBINED OXIDE REFRACTORIES (Uncl.)

The long range objective is to develop new ceramic compositions for increasingly severe conditions. Phase relations, mechanical properties, thermal expansion, and electrical properties will be studied for additional binary and ternary combinations of the relatively common oxides. Further, the effect of small quantities of added oxides on previously studied systems will be investigated, including the effect of the so-called rare earths.

Sponsored by: Office of Naval Research
Conducted by: National Bureau of Standards

FUNDAMENTAL STUDY OF CORDIERITE (Uncl.)

In this project fundamental phase studies are being made on all of the two phase heterogeneous systems which have cordierite as a common member in the ternary system (MgO, Al_2O_3, SiO_2). Accurate measurement of the coefficient of expansion, thermal conductivity, thermal shock behavior, and electrical properties are to be made.

Sponsored by: Office of Naval Research
Conducted by: Bureau of Mines

FUNDAMENTAL STUDIES OF CERAMIC MATERIALS (Uncl.)

This research is directed toward the determination of fundamental data on the properties of ceramic materials. Attention will be focused on crystalline bodies of high purity. To begin with, pure alumina, beryllia and zircon bodies will be investigated. First consideration will be given to the following properties: (1) strength at elevated temperatures, (2) resistance to thermal shock, and (3) weight per unit volume. Strength will be measured in bending.

Sponsored by: Office of Naval Research
Conducted by: Battelle Memorial Institute

HIGH TEMPERATURE TESTS OF SPECIAL CERAMICS (Uncl.)

The purpose of this work is to obtain mechanical strength and creep data on ceramic bodies of the porcelain type at elevated temperatures (specifically at and above 1500° F), under load in pure tension, for use in the design of gas turbine components.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

DEVELOPMENT OF CERAMIC MATERIALS (Uncl.)

Research is being conducted toward the development of improved ceramic materials with inherently moisture repellant surfaces. Materials are to be resistant to severe thermal shock, instantaneously cooled from 275° C to 0° C.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Rutgers University

VARIABLE, CERAMIC DIELECTRIC CAPACITORS (Uncl.)

Development of materials and processes to produce thin wafers for capacitors in exact dimensions and to be moisture repellant.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Stupakoff Ceramic & Manufacturing Company

INJECTION MOLDED CERAMIC PARTS (Uncl.)
Research toward the development of a ceramic material and process whereby this material can be injection molded: a glazing material which when applied to above material will meet the requirements of grade L-5 JAN-I-10.
Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Stupakoff Ceramic & Manufacturing Company

Combinations

HIGHLY REFRACTORY CERAMIC BODIES AND CERAMIC COATINGS FOR METALS (Uncl.)
This research is directed toward the development of highly refractory ceramic coatings for metals. Special consideration is being given to: the control of the iron oxidation during heating-up period, proper thermal expansion coefficients, use of metal flashes or special chemical treatment of the surface of the metal, use of special nongassing alloys, suppression of infrared emission, heat reflecting coatings for areas subject to heat radiation losses, mechanical impregnation of coating composition into metal surface, and combining of metal and ceramic materials.
Sponsored by: U. S. Air Force
Conducted by: University of Illinois

COMPOSITE WING STRUCTURES (Uncl.)
To determine the optimum composite ceramic and metal alloy wing construction for supersonic flight.
Sponsored by: U. S. Air Force
Conducted by: Ohio State University

CERAMIC AND METALLIC POWDER MIXTURES (Uncl.)
This research is directed toward development of ceramic combustion chambers, liners, and nozzles for special rocket motors. The phases of this work include studies of: oxides, ceramic and metallic powder mixtures, carbonaceous materials with or without metallic powder additions, metal impregnated ceramic materials, and mixtures, essentially oxides and/or other compounds.
Sponsored by: U. S. Air Force
Conducted by: Battelle Memorial Institute

STUDY OF REFRACTORY METAL COMBINATIONS FOR HIGH TEMPERATURE APPLICATIONS (Uncl.)

The objective of this project is to improve and evaluate high temperature properties of chromium borides combined with metal matrices. Methods of producing chromium boride crystals and combining them into sintered compacts with powdered metals will be studied, paying close attention to all details of the process and possible variation therein. Hot pressing will also be used. Hot hardness tests will be run on the specimens produced and additional tests at high temperature will be conducted as warranted.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: American Electro Metals Corp.

REFRACTORY, INSULATING, PROTECTIVE, CERAMIC COATINGS (Uncl.)

These investigations are concerned with the development of refractory, insulating, protective, ceramic coatings for metal. Based on methods of application, the phases of research are: electrolytic, electroosmosis, spraying, dipping, vaporization, and atomic hydrogen fusion. Determination of the physical properties of the coatings includes: adherence, effect on heat transmission and tensile strength, thermal shock resistance, and refractoriness.

Sponsored by: U. S. Air Force
Conducted by: Rutgers University

SPECIAL MATERIALS COMPOSED OF PURE METALLIC OXIDES (Uncl.)

Investigations are being conducted leading to the development of special materials composed of pure metallic oxides, carbides, nitrides, or derivations of metallic oxides and minerals commonly used in the ceramic industries. These bodies, when formed and fired in selected atmospheres, are tested in order to evaluate their suitability for use under various conditions of temperature and temperature change. Ceramic coatings for metal are also being studied.

Sponsored by: U. S. Air Force
Conducted by: Pennsylvania State College

TERNARY AND QUATERNARY OXIDE SYSTEMS FOR COATINGS (Uncl.)

This research is concerned with the development and application of ceramic coating for metals. Analyses are being made of ternary and quaternary oxides systems in which complete liquid miscibility occurs on melting.

Sponsored by: U. S. Air Force
Conducted by: Armour Research Foundation

HIGH-FREQUENCY ELEVATED-TEMPERATURE FATIGUE TESTS OF GAS TURBINE BUCKETS (Uncl.)

This project consists of subjecting gas turbine buckets to high-frequency (approximately 400,000 cycles per minute) fatigue tests simulating loading and temperature conditions reached in service in order to determine the properties of bucket materials under these conditions.

Sponsored by: U. S. Air Force
Conducted by: Air Material Command

HIGH-TEMPERATURE PROTECTIVE COATINGS FOR METALLIC TURBINE PARTS (Uncl.)

The objective of this project is to: (a) further develop high temperature ceramic coatings by design of improved frit compositions basing further modifications upon information so far obtained in the study and seeking the optimum adjustment of thermal expansivity, adhesiveness, refractoriness, continuity, and durability of the coatings under the conditions of service; (b) to carry out further experiments on the variety and content of materials for admixtures with the frit prior to application of the coatings, observing the effects upon the above named properties; (c) to improve the technique of using controlled furnace atmospheres for the firing of coatings on alloys which would otherwise oxidize during the firing process sufficiently so as to vitiate the adhesiveness and other properties of the coatings; (d) to determine pertinent physical and chemical properties of frits and coatings which will be developed, making use of such equipment as the interferograph, microscopes, and furnaces for high temperature treatment; and (e) the application of selected coatings to specimens for subjection to service or simulated service tests.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

PHASE RELATIONS OF METAL-CERAMIC COMBINATIONS (Uncl.)

This research is a study of phase relations in bodies made from mixtures of ceramic and metal powders. The following have been chosen for preliminary study: metals - silicon, aluminum, iron, chromium, nickel, manganese; ceramic materials - alumina, silica, magnesia, graphite, silicon carbide, zircon, and chromite.

Sponsored by: Office of Naval Research
Conducted by: New York State College of Ceramics, Alfred University

IMPROVEMENTS IN FORGING OF GAS TURBINE WHEEL ASSEMBLIES (Uncl.)
To develop improved commercial methods of forging gas turbine wheel assemblies. It is hoped to achieve stronger and more reliable bonds at the junction of the composite materials, by forging an integral assembly from a composite ingot, than are obtained by the present practice of fusion welding junctions in composite assemblies.
Sponsored by: U. S. Air Force
Conducted by: Canton Drop Forge Company

HYDRAULIC AND OTHER FLUIDS

DEVELOPMENT OF ANTISEIZE AND SEALING COMPOUND FOR USE WITH OXYGEN (Uncl.)
The object of this project is the development of an antiseize and sealing compound suitable for use on oxygen cylinder valves.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF NONINFLAMMABLE HYDRAULIC FLUID FOR AIRCRAFT USE (Uncl.)
The objective of this project is the development of suitable noninflammable hydraulic fluid compositions.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF SILICONE FLUID FOR BUBBLE SEXTANTS (Uncl.)
To obtain fluid which permits better operation of instruments at low temperature.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF HYDRAULIC FLUIDS, LUBRICANTS, FUELS AND RELATED MATERIALS (Uncl.)
A study is being conducted to assemble a background based on solid experimental facts of lubrication theory and practice so that new problems may be anticipated and that the ever-changing design requirements of U. S. Air Force equipment may be carried through without excessive hold-up on particular pieces of equipment.
Sponsored by: U. S. Air Force
Conducted by: Pennsylvania State College

FLUOROCARBONS AS LESS INFLAMMABLE BASE STOCKS FOR HYDRAULIC FLUIDS AND LUBRICANTS (Uncl.)

This project covers a general survey of the field of fluorocarbons in the direction of the development of less inflammable hydraulic fluids and lubricants.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

LESS INFLAMMABLE AIRCRAFT HYDRAULIC FLUID (Uncl.)

This project covers the development of a less inflammable hydraulic fluid for use in aircraft hydraulic systems. This project consists of developing an application using the basic materials developed under project No. 601-287.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

INSPECTION AND TESTING METHODS

DEVELOPMENT OF SPECIFICATION TEST REQUIREMENTS FOR MAGNETIC PARTICLE INSPECTION MATERIALS (Uncl.)

The objective of this project is the development of technical requirements and methods of sampling, inspection and test for the qualification of magnetic particle inspection materials, and the preparation of appropriate specification drafts for coordination purposes.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF STANDARDS FOR RADIOGRAPHIC AND FLUOROSCOPIC INSPECTION OF LIGHT ALLOY CASTINGS (Uncl.)

The objective of this project is to develop X-ray acceptance standards for castings for use by inspectors.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

DEVELOPMENT OF TECHNIQUES FOR SUPERSONIC INSPECTION OF MATERIALS (Uncl.)

The objective of this project is the investigation of the utility of supersonic inspection techniques as applied to the inspection of representative new and used aircraft parts.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF MAGNETIC PARTICLE INSPECTION OF ELECTROPLATED MATERIALS (Uncl.)

The objective of this project is the investigation of the effect of chromium, nickel, and other electroplates on the efficiency of magnetic particle inspection of plated parts where currently available data on them are incomplete or inconclusive.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF TECHNIQUES FOR SPECTROGRAPHIC ANALYSIS OF MAGNESIUM ALLOYS (Uncl.)

This project provides for the development of new spectrographic procedures for the quantitative analysis of certain magnesium alloys with particular emphasis on procedures for the analysis of heavy metal impurities in these alloys, such as iron and nickel.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF EQUIPMENT AND TECHNIQUE FOR IDENTITY TESTING (Uncl.)

This project provides for the evaluation of available equipment with special emphasis on applicability to testing improperly processed parts already installed in aircraft. It also provides for the development of accessory equipment for specific naval aircraft part testing problems and development of appropriate testing techniques.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

SPOT CHECKING OF BRIGHT ROTATIONAL FLUOROSCOPY (Uncl.)

This project is to investigate further the method initiated by the California Institute of Technology for the inspection, primarily, of light alloy parts.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

DEVELOPMENT OF FLUORESCENT PENETRANT INSPECTION TECHNIQUES AND APPLICATIONS (Uncl.)

The objective of this project is the investigation of new applications where the use of fluorescent inspection procedures, particularly the Zyglo and Magnaglo methods, will improve current inspection of naval aircraft parts by both contractors and naval air activities.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Station, Norfolk, Va.

DEVELOPMENT OF EQUIPMENT AND TECHNIQUE FOR ENDURANCE TESTING (Uncl.)

This project provides for the development, manufacture, and calibration of endurance testing and accessory equipment and development of testing techniques and procedures when the above are applicable to general investigational work.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF EQUIPMENT AND TECHNIQUE FOR SPECTROGRAPHIC ANALYSIS (Uncl.)

This project provides for the development, manufacture, and calibration of spectrographic testing and accessory equipment, and the development of testing techniques and procedures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PLASTIC, BOND STRENGTH OF LAMINATES (Uncl.)

To develop a more suitable test method for bond strength of laminates - using tensile pull perpendicular to laminations.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

APPLICATION OF THE ELECTRON MICROSCOPE TO THE STUDY OF AIRCRAFT MATERIALS (Uncl.)

This project includes placing in operation, adjustment, and calibration of an R.C.A. Type EMU-2 electron-microscope and the development of special techniques for the critical examination and improvement of aircraft materials.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

EFFECT OF RAPID LOADING ON THE PROPERTIES OF AIRCRAFT MATERIALS (Uncl.)

This project covers equipment to be built and a study to be made by California Institute of Technology to determine the effect of rate of loading on the elastic limit of 24S-T aluminum alloy, 75S-T aluminum alloy, and 4130 steel.

Sponsored by: U. S. Air Force
Conducted by: California Institute of Technology

DETERMINATION OF FATIGUE PROPERTIES OF VARIOUS AIRCRAFT MATERIALS ON SCHENCK FATIGUE TESTER (Uncl.)

To determine by this type test the fatigue properties of several materials (2330 steel, 75S-T aluminum, etc.) and also the effect of notches on the fatigue properties.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

INVESTIGATION OF ULTRASONIC METHODS OF INSPECTING CEMENTED JOINTS (Uncl.)

To develop equipment and methods for nondestructive testing of joints assembled with adhesives.

Sponsored by: U. S. Air Force
Conducted by: Goodyear Aircraft Corp.

DEVELOPMENT AND EMISSION SPECTROGRAPHIC PROCEDURES FOR COMPOSITIONAL ANALYSIS (Uncl.)

This project covers the development and standardization of quantitative and compositional analysis procedures by emission spectrographic means.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

SPECTROGRAPHIC METHODS OF STEEL ANALYSIS (Uncl.)

Spectrographic analysis of steel is used not only as an inspection test, but as a research tool in connection with investigation of welding and other problems. The improvement of existing and development of new techniques will advance research in these fields and this project covers necessary investigation to accomplish this purpose.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

NONDESTRUCTIVE TESTS OF FERROUS AND NONFERROUS METALS (Uncl.)

This project covers necessary investigation and work to determine the applicability of, and to adapt existing nondestructive test methods to ordnance problems, and also, where necessary, to develop suitable test methods for the purpose.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Watertown Arsenal

PLAN OF SAMPLING, INSPECTION AND TESTING OF MOLDED THERMOSETTING MATERIALS (Uncl.)

Presently specified procedures for sampling, inspection, and testing of molded thermosetting materials are inadequate in that the procedures are too lengthy, too large an amount of material is required, and the data developed may not correlate with actual production. This project covers work to develop data to improve presently specified procedures.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Picatinny Arsenal

RELATIONSHIP BETWEEN VARIOUS HARDNESS NUMBERS (Uncl.)

This project covers an investigation into the relationship between Tukon, Vickers, Baby Brinell, and Rockwell hardness numbers.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Frankford Arsenal

SPECTROGRAPHY, METHODS FOR ANALYSIS OF CERAMIC MATERIALS (Uncl.)

Establishment of methods for the quantitative spectrochemical analysis of various raw and finished ceramic materials.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Applied Research Laboratory

X-RAY STUDY OF FATIGUE DAMAGE (Uncl.)

A study of methods of detecting incipient fatigue cracks in ferrous metals.

Sponsored by: National Bureau of Standards
Conducted by: National Bureau of Standards

FABRIC TESTER (Uncl.)

The development of a fabric tester is being completed to provide a nondestructive means whereby the strength of doped fabrics as commonly used on aircraft could be determined.

Sponsored by: Civil Aeronautics Administration
Conducted by: Civil Aeronautics Development Station

DEVELOPMENT OF TEST METHODS FOR ORGANIC PLASTICS (Uncl.)

To develop improved test procedures for acceptance of organic plastic materials that will adequately predict service performance.

Sponsored by: Office of Quartermaster General
Conducted by: Fabrics Research Laboratory, Boston, Mass.
National Bureau of Standards, Washington, D. C.

INVESTIGATION OF MECHANISM OF FAILURE OF LIGHT ALLOYS (Uncl.)

The objective of this project is to complete an experimental apparatus for observing and photographing, under high magnification, the behavior of metals while being subjected to loads at various temperatures, and to make analytical studies on several aluminum and magnesium alloys with this apparatus.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Everett Chapman Laboratories

FRACTOGRAPHY (Uncl.)

Specifically, the work consists of a general orienting review of various metals and alloys to classify the revealing variations which have significance with regard to the lattice structure and location of the elements in the periodic table. A study is being conducted on the changes in structure throughout several constitutional systems, such as Fe-Si, Bi-Zn, and Bi-Sb.

Sponsored by: Office of Naval Research
Conducted by: Carl A. Zapffe Laboratories

HARDNESS OF METALS AT ELEVATED TEMPERATURES (Uncl.)

This project consists of development of a testing machine and procedures for the determination of the hardness of metals at high temperatures.

Sponsored by: National Bureau of Standards
Conducted by: National Bureau of Standards

LIGHT ALLOYS AND OTHER NONFERROUS ALLOYS

Aluminum Base

INVESTIGATION OF CORROSION RESISTANCE OF M-125-T ALUMINUM ALLOY (Res.)

The objective of this project is to evaluate the resistance to corrosion by tidewater and marine atmosphere exposure of M-125-T aluminum alloy sheet and extrusions.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

INVESTIGATION OF METALLURGICAL AND MECHANICAL PROPERTIES OF R303 ALUMINUM ALLOY (Uncl.)

The objective of this project is to evaluate the suitability of the subject material for use in naval aircraft, to obtain data on the properties of the material for use in establishing design allowable strength values and other design data and for use in preparation of procurement specifications for the material.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF ALMAG-55 ALUMINUM ALLOY (Uncl.)

To determine the suitability for use in naval aircraft of Almag-55 aluminum casting alloy, produced by Acme Aluminum Alloys, Inc., and to obtain information for establishing design strength allowable values and other design data and for preparing a procurement specification for the material.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF THE EFFECTS OF CONTINUOUS EXPOSURE OF LIGHT METAL ALLOYS (Uncl.)

To determine the corrosion rates of aluminum and magnesium alloys and structural components used in aircraft, after exposure to the weather and in the tidewater, under marine conditions as exemplified by the exposure racks located at the Norfolk Naval Air Station, Hampton Roads, Va.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

EFFECT OF FREQUENCY OF LOADING UPON THE FATIGUE STRENGTH OF ALUMINUM ALLOY SHEET (Uncl.)

To determine the effect of varying the frequency of loading during each test upon the fatigue strength of aluminum alloy sheet specimens, especially of low frequencies.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

TESTING OF SPOT-WELDED ALUMINUM-ALLOY PANELS (Uncl.)

To conduct a special investigation on the mechanical properties of spot-welded aluminum-alloy panels which were exposed to salt water and atmospheric corrosion conditions by the Bureau of Standards.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: Rensselaer Polytechnic Institute

THE EFFECT OF ALLOYING ELEMENTS ON THE PLASTIC PROPERTIES OF ALUMINUM ALLOYS (Uncl.)

The purpose of this investigation is to study the effects of alloying elements in solid solution on the "effective stress-effective strain" curve of specially prepared aluminum alloys. The objective is to formulate theories governing the laws of fracture and plastic deformation to aid in the development of aluminum alloys that have high strength and superior forming properties. The laws for fracture and the plastic properties are being studied in terms of the atomic numbers, atomic radii, microstructure, and concentration of foreign elements.

Sponsored by: Office of Naval Research
Conducted by: University of California

INVESTIGATION OF RESISTANCE OF AIRCRAFT MATERIALS AND STANDARDIZED ASSEMBLIES TO GUN FIRE (Uncl.)

It is proposed to establish standard and fundamental test procedures for evaluating the relative resistance of aircraft materials and structures to damage by gun fire and to obtain data on aircraft materials using these procedures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF THE INTENSITY OF FLASH PRODUCED BY CAL-50AP AMMUNITION ON DIFFERENT AIRCRAFT SHEET MATERIALS (Uncl.)

It is desired to obtain data on the flash characteristics of various light alloys when subjected to gun fire. The materials being investigated are those which could be used in the construction of aircraft gasoline tanks.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

EFFECT OF VARIOUS ADDITION AGENTS TOGETHER WITH VARIATIONS OF MELTING AND POURING TEMPERATURES ON THE GRAIN-SIZE OF CAST ALUMINUM ALLOYS (Uncl.)

It is proposed to investigate the quantitative effect of additions of various elements singly or in combination at various temperatures of melting and pouring, on the grain size of cast aluminum alloys used by the U. S. Navy. The effects of columbium, zirconium, boron, chromium, molybdenum, vanadium, tungsten, cerium, beryllium, and manganese will be studied as a function of composition and melting and pouring temperatures.

Sponsored by: Office of Naval Research
Conducted by: Bureau of Ordnance, Naval Gun Factory

GRAIN GROWTH IN METALS (Uncl.)

This study includes a fundamental investigation of grain growth in metals and alloys, with particular emphasis on aluminum and magnesium. The grain size will be studied as a function of annealing temperature and time and also of chemical composition. Isothermal grain growth will be investigated to determine the effect of increasing amounts of inhibiting agents, such as manganese, titanium, and molybdenum.

Sponsored by: Office of Naval Research
Conducted by: University of Notre Dame

INVESTIGATION OF THE CORROSION RESISTANCE OF R-303 ALUMINUM ALLOY (Res.)

The objective of this project is to determine the composition and the susceptibility to intergranular and to stress corrosion of R-303 aluminum alloy as supplied by the manufacturer and also after reheat treatment.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

DEVELOPMENT OF ALUMINUM-BERYLLIUM ALLOYS (Uncl.)

The objective of this project is to develop aluminum-beryllium base alloys with improved properties for specialized applications in naval aircraft requiring the optimum in such properties as high strength at elevated temperatures, high modulus of elasticity, low density, and high coefficient of thermal conductivity.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Armour Research Foundation

DEVELOPMENT ALUMINUM ALLOY LANDING GEAR ALEO STRUTS (Uncl.)

Weight saving in an airplane - development of aluminum alloy landing gears to replace conventional steel construction.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Grumman Aircraft Engineering Corporation

INVESTIGATION OF THE PROPERTIES OF M-125 ALUMINUM ALLOY (Res.)

The objective of this project is to determine the properties of an experimental aluminum alloy, M-125, and therewith to aid the producer in the development of a commercially producible alloy of this type and develop methods of design and fabrication of aircraft assemblies with this type of alloy.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Consolidated Vultee Aircraft Corporation, San Diego, Calif.

DEVELOPMENT OF ALUMINUM ALLOYS FOR ELEVATED TEMPERATURE APPLICATIONS (Uncl.)

The objective of this project is to develop new aluminum alloys possessing improved properties for applications involving exposure to temperatures in the range 300°-400° C.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

INVESTIGATION OF 75S ALUMINUM ALLOY RIVETS (Uncl.)

The objective of this project is to determine the suitability for use in naval aircraft of 75S aluminum alloy rivets produced by the Aluminum Company of America and to obtain information for establishing design strength allowable values and other design data and for preparing a procurement specification for the product.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEEP DRAWING CHARACTERISTICS OF ALUMINUM ALLOYS (Uncl.)

Complete information is not available regarding the properties of cold worked deep drawn aluminum alloys. The project is for the purpose of developing data on the properties of aluminum alloys when subjected to such operations.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Frankford Arsenal

METAL AIRFIELD LANDING MATS, 70,000 POUND WHEEL LOAD (Uncl.)

The purpose of this project is to develop a transportable emergency landing mat, fabricated from steel, aluminum or magnesium alloy which will sustain, for a period of one year, the normal operations of military aircraft having a dual wheel load of 70,000 pounds or a tire pressure of 170 psi.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

MECHANICS OF PLASTICITY FOR COMBINED STRESSES (Uncl.)

This project covers the determination of the strength, ductility, and stress-strain relations in the plastic range for 24S-T aluminum alloy subjected to combined stresses.

Sponsored by: U. S. Air Force
Conducted by: Pennsylvania State College

MECHANICAL PROPERTIES OF METALS AT VERY LOW TEMPERATURES (Uncl.)

This project covers the determination of the mechanical properties of aircraft structural materials over the temperature range from room temperature down to -250° C.

Sponsored by: U. S. Air Force
Conducted by: Ohio State University

PROPERTIES OF A NEW HIGH TEMPERATURE ALUMINUM ALLOY (Uncl.)

To develop aluminum alloys which can be used at 600° F temperature, and for use on jet and rocket engine parts.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

COMPRESSIVE TESTS OF PLASTIC BONDED ALUMINUM ALLOY SHEET-STRINGER COMBINATIONS (Uncl.)

This project consists of tests of sheet-stringer combinations of aluminum alloy sheet bonded by cycle weld plastic adhesive to extruded aluminum alloy hat-sections and channel sections to be tested axially in static compression.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

FATIGUE CHARACTERISTICS OF SOME ALUMINUM AND MAGNESIUM ALLOY FORGINGS (Uncl.)

This project covers an investigation of the comparison of the fatigue properties of forgings and castings of aircraft structural aluminum and magnesium alloys.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DEVELOPMENT OF LIGHT WEIGHT NONCORROSIVE ALLOYS (Uncl.)

Research toward the development of noncorrosive light weight magnesium and aluminum alloys.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Lehigh University

TENSILE AND CREEP TESTS ON TWO ALUMINUM ALLOYS (Uncl.)

To determine the tensile strength at room temperature and at 600° F and the creep strength at three load levels at 600° F of two special aluminum alloys.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: Battelle Memorial Institute

GUN FIRE TESTS ON ALUMINUM ALLOY BOXES (Uncl.)

Comparison of firing tests of aluminum alloy boxes and magnesium boxes.

Sponsored by: U. S. Air Force
Conducted by: Goodyear Aircraft Corp.

P-80 ALUMINUM ALLOY WING PANELS (Uncl.)
To investigate thick skin aluminum alloy monocoque structures and determine their structural efficiency and their stability in a performance airplane having a high wing loading.
Sponsored by: U. S. Air Force
Conducted by: East Coast Aeronautics, Inc.

Magnesium Base

INVESTIGATION OF EXTRUDED MAGNESIUM ZIRCONIUM ALLOY (Uncl.)
The objective of this project is to obtain a practical evaluation of the mechanical properties of magnesium-zirconium alloy to determine its suitability for use in naval aircraft construction.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

SUSCEPTIBILITY OF MAGNESIUM BASE ALLOYS TO STRESS CORROSION CRACKING (Uncl.)
The object of this project is to investigate methodically the phenomenon of stress corrosion in magnesium alloys and to determine the limits within which these alloys can be expected to function satisfactorily.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

METALLURGICAL INVESTIGATION OF MAGNESIUM ALLOY WING PANEL SAMPLES (Uncl.)
The objective of this program is to evaluate sample sheet and stringer sections from an SNJ magnesium wing panel which has had extended service life. Tensile tests and fatigue tests will be conducted to obtain data on the stability of magnesium alloys which have been subjected to service normally encountered in a stressed structure.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF MAGNESIUM TUBING FOR METHYL BROMIDE FIRE EXTINGUISHING SYSTEMS (Uncl.)
It is proposed to determine the susceptibility of magnesium alloy tubing to corrosion when exposed to methyl bromide.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

MAGNESIUM ALLOY TAIL BOOMS FOR P-61 AIRPLANES (Uncl.)

Development of new magnesium alloy (FS-1h) to determine its suitability as an aircraft structural material.

Sponsored by: U. S. Air Force
Conducted by: The Dow Chemical Company

P-80 MAGNESIUM ALLOY WING PANELS (Uncl.)

To develop magnesium alloys and thick skin monocoque construction and to determine their suitability for this purpose in a high performance airplane having a high wing loading.

Sponsored by: U. S. Air Force
Conducted by: East Coast Aeronautics, Inc.

MAGNESIUM COVER FOR P-51 ELEVATORS (Uncl.)

To determine the suitability of magnesium covering for control surfaces on pursuit type aircraft in alleviating ballooning due to air loads.

Sponsored by: U. S. Air Force
Conducted by: The Dow Chemical Company

AT-6 MAGNESIUM WING PANELS (Uncl.)

To investigate the general service characteristics of primary structural parts fabricated of FS-1h magnesium alloy.

Sponsored by: U. S. Air Force
Conducted by: The Dow Chemical Company

A-20 MAGNESIUM WING PANEL (Uncl.)

Laboratory and service tests of thick skin magnesium wing on light bombardment type aircraft.

Sponsored by: U. S. Air Force
Conducted by: The Dow Chemical Company

MAGNESIUM CASTING ALLOYS (Uncl.)

A comprehensive investigation will be made of the magnesium-zinc-zirconium and the magnesium-zinc-cerium casting alloys. The optimum compositions and heat treatments will be determined and the alloys evaluated with respect to presently used compositions. An investigation will also be made of the properties of cast magnesium-cerium alloys.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

BERYLLIUM IN MAGNESIUM CASTING ALLOYS (Uncl.)

The effects of the addition of small amounts of beryllium on the castability and physical properties of the common alloys is being determined.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

NEW MAGNESIUM ALLOYS (Uncl.)

To make available fundamental information on which to base a choice of promising magnesium alloy systems for further investigation. The program aims at development of a new and stronger magnesium alloy sheet composition.

Sponsored by: U. S. Air Force
Conducted by: Rensselaer Polytechnic Institute

HIGH STRENGTH MAGNESIUM ALLOYS (Uncl.)

The purpose of this project is to develop magnesium alloys having high structural strength and minimum flammability, that will be suitable for landing mat fabrication or other structures.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering Research & Development Laboratory, Fort Belvoir, Va.

SERVICE TESTS - MAGNESIUM ALLOY OUTER WING PANELS (Uncl.)

To determine service characteristics of magnesium alloy outer wing panels installed on SNJ type airplanes. To obtain data from service tests applicable to magnesium structures in general in regard to suitability for use in naval aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Station, Pensacola, Fla.

DEVELOPMENT OF MAGNESIUM ALLOY WING PANELS (Uncl.)

To determine most efficient magnesium alloy structures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: The Dow Chemical Company

DEVELOPMENT OF MAGNESIUM-LITHIUM BASE ALLOYS (Res.)

The objective of this project is to develop magnesium-lithium alloys with properties superior on a strength weight basis to high strength aluminum alloys.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Mathieson Alkali Works

DEVELOPMENT OF MAGNESIUM-CERIUM ALLOYS FOR ELEVATED TEMPERATURE SERVICE (Uncl.)

Tensile and creep tests are being conducted on magnesium-cerium based alloys with varying additions of molybdenum, tungsten, vanadium, strontium, cobalt, mercury, phosphorus, potassium, and sodium.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Battelle Memorial Institute

Other

DEVELOPMENT OF DUCTILE TITANIUM AND HIGH-STRENGTH TITANIUM BASE ALLOYS (Uncl.)

The objective of this project is to develop and produce ductile titanium base alloys with physical and mechanical properties generally superior to those of titanium produced up to this time.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: P. R. Mallory & Co., Inc.

DESIGN, FABRICATION AND EVALUATION OF TITANIUM ALLOY FLOAT (Uncl.)

It is proposed to evaluate presently available ductile titanium sheet in an aircraft structure under laboratory and actual operating conditions.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EFFECT OF ALLOYING ELEMENTS ON THE PRESSURE TIGHTNESS OF BRONZE (Uncl.)

A study is being undertaken to determine the effect of various percentages of certain impurities, particularly silicon, on the pressure tightness of bronze castings.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

ORGANIC COATINGS

Aircraft Finishes

THE PHYSICAL AND CHEMICAL PROPERTIES OF ORGANIC FINISHES (Uncl.)
This research consists of a fundamental study of the physical and chemical properties of organic finishes as applied to metal surfaces, with particular emphasis on the use of modern physical instruments. It includes a study of the interfacial properties of these films and the surfaces to which they are applied.
Sponsored by: Office of Naval Research
Conducted by: Battelle Memorial Institute

SYNTHESIS OF IMPROVED RESINS FOR USE IN AIRCRAFT FINISHES (Uncl.)
The objective of this project is to develop new resins for aircraft finishes for increased service life.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Brooklyn Polytechnic Institute

DETERMINATION OF PROCEDURE FOR AERODYNAMIC SMOOTHNESS OF AIRCRAFT FINISHES (Uncl.)
The object of this project is to determine physical properties of surfacing materials requisite for obtaining aerodynamically smooth surfaces and to prepare specifications for procurement of these materials.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DETERMINATION OF WEIGHT OF EXTERIOR FINISHES ON NAVAL AIRCRAFT (Uncl.)
The objective is to establish the weights of various exterior finish schemes applied to naval aircraft.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PREPARATION OF SPECIFICATION FOR SANDING, CUTTING, AND WAXING MATERIALS AND EQUIPMENT (Uncl.)
The object of this project is to determine the physical properties of sanding, cutting, and waxing materials and types of equipment necessary to obtain maximum efficiency in achieving aerodynamically smooth exterior finishes on naval aircraft in order to prepare specifications for procurement.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

TEST OF DU PONT "METALLI-CHROME" FINISH (Uncl.)

The object of this project is to evaluate the physical properties of this material, particularly durability, in order to establish a comparison with standard finishes.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

QUALIFICATION TEST OF RUBBING MATERIALS FOR PRODUCING AERODYNAMICALLY SMOOTH SURFACES (Uncl.)

The objective is to determine conformance to applicable specifications in order to establish qualification as satisfactory products.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EVALUATION OF IMPROVED RESINS FOR USE IN AIRCRAFT FINISHES (Uncl.)

To establish data and procedures for the development, control, and application of new type resins to organic aircraft finishes.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF IMPROVED TOP COAT FOR USE IN NAVAL AIRCRAFT (Uncl.)

Develop an organic coating consisting of a pigmented intro-cellulose-acrylate base having better weathering characteristics and abrasion resistance than Specification AN-L-8 lacquer.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

QUALIFICATION TESTING OF ORGANIC FINISHING MATERIALS (Uncl.)

The objective is to determine conformance to applicable specifications in order to establish qualification as satisfactory products.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

AN-E-7 ENAMEL (Uncl.)

The objective is to determine conformance to applicable specifications in order to establish qualification as satisfactory product.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

TESTS OF VOLATILE-FREE ORGANIC COMPOSITIONS AS FINISHING MATERIALS FOR AIRCRAFT METALS (Uncl.)

The objective of this project is to establish a parallel project to assist the University of Cincinnati in prosecution of its work on the development of a completely nonvolatile fluid organic finishing system for aircraft metals being conducted under Contract NOa(s) 8491.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF VOLATILE-FREE ORGANIC COMPOSITIONS AS FINISHING MATERIALS FOR AIRCRAFT METALS (Uncl.)

The objective of this project is to develop a completely non-volatile fluid organic finishing system for aircraft metals.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: University of Cincinnati

Corrosion Resistant Finishes

INTERIOR COATING FOR HYDRAULIC ACCUMULATORS FOR ARRESTING GEAR AND CATAPULTS (Uncl.)

The object of this project is to develop a practicable coating material for the interior of hydraulic accumulators which will permit use of conventionally inhibited aqueous solutions of ethylene glycol as the hydraulic fluid without corrosion of the walls of the vessel.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

QUANTITATIVE TEST METHOD FOR MEASURING PAINT ADHESION (Uncl.)

The objective of this project is to develop a quantitative test method for measuring adhesion of organic protective coatings to aircraft metal surfaces.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: University of Cincinnati

UNDERWATER PAINTS AND ANTIFOULING PIGMENTS (Uncl.)

Currently designed experiments strive to produce basic information on the functional characteristics of each constituent of an anti-fouling and anticorrosive coating.

Sponsored by: Navy Bureau of Ships
Conducted by: A. C. Frue, Miami Beach, Fla.

TESTS OF TEMPORARY PROTECTIVE COATINGS FOR USE ON NAVAL AIRCRAFT (Uncl.)
The objective is the establishment of the rate of removal of various temporary organic coatings from aircraft by water.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DUAL PURPOSE CORROSION PREVENTATIVE AND STRIPPABLE FILM (Uncl.)
The object of this project is to develop a transparent preservative film of the strippable type for preservation of steel aircraft components in storage.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

QUANTITATIVE TEST METHODS FOR MEASURING ADHESION OF ORGANIC PROTECTIVE COATINGS (Uncl.)
The objective of this project is to establish a parallel project to assist the University of Cincinnati in prosecution of its work on the development of a quantitative test method for measuring adhesion of organic coatings to metal surfaces.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

IMPROVEMENT OF ANTIFOULING PAINT (Uncl.)
The objective of this project is to improve the formulation of the existing finish, Specification M-559, for flying boat hull bottoms to improve its flexibility, coating anchorage, and hydrocarbon resistance.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

STUDY OF ELECTRICAL CONDUCTANCE METHOD TO EVALUATE COMPARATIVE PROTECTION OF ORGANIC PROTECTIVE FILMS (Uncl.)
The objective of this project is to evaluate the electrical conductance method as a procedure for determining physical properties of protective coatings such as anticorrosion, water permeability, and durability.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF APPLICATION OF PHYSICAL METHODS AND MODERN INSTRUMENTS TO STUDY OF PROPERTIES OF ORGANIC PROTECTIVE FILMS (Uncl.)

The object of this project is to develop new or improved testing methods using the advanced instruments and techniques for the purpose of determining and predicting characteristics, such as durability, adhesion, corrosion resistance, and so forth, in the shortest possible time to avoid lengthy exposure tests.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Battelle Memorial Institute

DEVELOPMENT OF IMPROVED PROTECTIVE SYSTEMS FOR MAGNESIUM (Uncl.)

The object of this project is to develop an improved anticorrosion primer and topcoat for magnesium alloys.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

DEVELOPMENT OF INTERIOR COATING FOR HYDRAULIC ACCUMULATORS FOR ARRESTING GEAR AND CATAPULTS (Uncl.)

The object of this project is to develop a practicable coating material for the interior of hydraulic accumulators which will permit the use of conventionally inhibited aqueous solutions of ethylene glycol as the hydraulic fluid without corrosion of the walls of the vessel.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

Fabric Coatings

INVESTIGATION OF HIGH-SOLIDS FINISHES (Uncl.)

The objective of this project is to develop high-solids dopes which can be applied to aircraft fabric to permit a decrease in the number of coats of material applied.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

INVESTIGATION OF STRENGTH OF DOPED AIRCRAFT FABRIC (Uncl.)

The object of this project is to obtain more data of a reliable character on the strength of doped fabric and to correlate tensile and Mullen tests in order to provide a means of determining the degree of deterioration of doped fabric after various periods of use on aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DETERMINATION OF STRENGTH OF ATTACHMENT OF PREDOPED FABRIC (Uncl.)
The object of this project is to determine the possibility of substituting predoped fabric for standard fabric on naval aircraft.
Sponsored by: Naval Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF FIREPROOF FABRIC COATINGS (Uncl.)
The object of this work is to develop a fireproof fabric coating to be applied over doped fabric surfaces to render them capable of withstanding fires of at least 30 seconds duration.
Sponsored by: Civil Aeronautics Administration
Conducted by: National Bureau of Standards

EVALUATION OF DOPE TESTING METHODS (Uncl.)
The objective is to evaluate test methods incorporated in specifications for dope used by the Royal Canadian Air Force.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF CELLULOSE ACETATE PROPIONATE DOPES (Uncl.)
The objective of the project is the development of a cellulose acetate propionate dope to replace cellulose acetate butyrate dope in order to obtain better life and adhesion on fabric.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

EVALUATION OF PREDOPED FABRIC FOR USE ON AIRPLANE WING SURFACES (Uncl.)
The object of this project is to determine the possibility of using predoped fabric on naval aircraft.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

INVESTIGATION OF FLAME RESISTANT DOPE (PYROPEX) (Uncl.)
The objective of this project is to determine possible advantage to be obtained from the use of this material.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

CELLULOSE-ACETATE-BUTYRATE AND PROPIONATE RESIN TYPE LACQUER (Uncl.)
The objective of this project is to develop lacquers which are compatible with the cellulose-acetate-butyrate dopes employed on fabric surfaces of aircraft and which can also be applied to primed metal surfaces in order to eliminate use of two types of topcoats and two masking operations.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

ADHESION OF CELLULOSE-ACETATE-BUTYRATE DOPE TO FABRIC - IMPROVEMENT OF (Uncl.)

The objective of this project is to improve the adhesion of cellulose-acetate dope to fabric on naval aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

TEST OF NITROPROPANE, THINNER, CELLULOSE-ACETATE-BUTYRATE DOPE (Uncl.)

The objective of this project is to determine possible advantages to be gained by use of this thinner, such as decreased viscosity, blushing, and so forth, and to determine the durability and brittleness of fabrics finished with dopes thinned with this material.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

Fairing Compounds and Miscellaneous

EVALUATION OF FAIRING PUTTIES (Uncl.)

The objective is to establish the low-temperature vibration resistance of fairing putties.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

EVALUATION OF FAIRING PUTTIES (Uncl.)

The objective of this project is to establish a parallel project to complement work at Mellon Institute on the development of a fairing putty for use on aircraft exterior surfaces under a contract being processed.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

TESTS OF AROMATIC FUEL-RESISTANT LACQUER FOR DROP TANKS (Uncl.)

The object of this project is to determine optimum materials and application and draining techniques for lining external auxiliary fuel tanks with the aromatic fuel-resistant lacquer, M-769.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF ORGANIC PROTECTIVE COATINGS (Uncl.)

Part of this project concerns the investigation of materials for use as antifogging and anti-icing compounds on aircraft windows.

Sponsored by: U. S. Air Forces
Conducted by: Air Materiel Command

High Temperature Coatings

INVESTIGATION OF SILICONE PAINTS AS HEAT-RESISTANT FINISHES (Uncl.)
The objective of this project is to develop a paint vehicle incorporating silicones to withstand temperatures between 500° F and 1000° F.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

DEVELOPMENT OF HEAT-RESISTING AIRCRAFT FINISH (Uncl.)
The object is to develop an aircraft finish providing adequate protection to steel surfaces exposed to elevated temperature (approximately 750° F).
Sponsored by: Navy Bureau of Aeronautics
Conducted by: University of Louisville

DURABLE HEAT-GLAZING SILICONE FOR PROJECTILE COATING (Res.)
To develop a durable silicone coating material that will not be affected by aging and can be applied to projectiles to preserve in storage and reduce high temperature effect caused by air friction when fired.
Sponsored by: Navy Bureau of Ordnance
Conducted by: Southern Research Institute, Birmingham, Ala.

EVALUATION OF HEAT-RESISTING AIRCRAFT FINISH (Uncl.)
The object of this project is to establish a parallel project to assist the University of Louisville in the prosecution of its work on the development of a heat-resisting finish for protection of steel components of aircraft exposed to high temperatures.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

USE OF PHENOLIC RESIN FOR INDICATOR FOR RECIPROCATING AND TURBO-JET ENGINES INTERNAL TEMPERATURE (Uncl.)
The objective of this project is to evaluate phenolic resin coating as a temperature-indicating finish for internal parts of reciprocating and turbo-jet engines.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF IMPROVED EXTERIOR FINISH FOR HIGH-SPEED AIRCRAFT (Uncl.)
The objective of the project is to develop an organic coating which will withstand the conditions encountered at high speeds in modern naval aircraft.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

Metal Primers

TEST OF MIMAX BLACK PRIMER (Uncl.)
The objective of this project is to determine any possible advantages to be gained by use of this material for corrosion protection of aircraft metal surfaces.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

ONE COAT CAMOUFLAGE PAINT (Uncl.)
Research toward the development of a one coat camouflage paint with the characteristic of good adhesion to metal surfaces without previous treatment.
Sponsored by: Signal Corps Engineering Laboratories
Conducted by: New York University

ZINC CHROMATE PRIMER, WATER EMULSION (Uncl.)
The object of this project is to develop a primer applicable to damp aircraft metal surfaces.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PRIMERS FOR USE ON AIRCRAFT STEEL (Uncl.)
The objective of this project is the development of a primer for steel aircraft parts having the same (or better) characteristics of application, thickness, and protection as the zinc chromate primer used on aluminum alloy.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PRIMERS FOR FERROUS METALS (Uncl.)
This project is for the purpose of developing a primer for light gage steel superior to those currently available.
Sponsored by: Materials Branch, Army Ordnance
Conducted by: Army Proving Grounds

Rubberized Coatings

TEST OF CHLORINATED RUBBER FINISHING MATERIAL FOR USE ON EXTERIOR SURFACES OF NAVAL AIRCRAFT (Uncl.)
The objective of this project is to determine possible advantages accruing from the use of finishes based on chlorinated natural or synthetic rubber.
Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PLASTICIZER - POLYMER RELATIONSHIP (Uncl.)

The object of this project is to determine the relationship between the physical properties of polymers, plasticizers, and their combinations to indicate proportions required to obtain optimum properties.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

SYNTHETIC RUBBER IN COATINGS (Uncl.)

This project is for the purpose of developing new formulations and evaluating new coatings, and is being conducted cooperatively with industry.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Frankford Arsenal

PACKAGING, PACKING, PRESERVATION, AND CORROSION PREVENTIVE COMPOUNDS

ORGANIC CHEMICALS WITH CORROSION INHIBITING PROPERTIES (Uncl.)

The objective of this project is to evaluate the preservative properties of pure organic chemicals.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

VAPOR PHASE CORROSION INHIBITOR (Uncl.)

The objective of this project is to determine the applicability of vapor phase corrosion inhibitor to parts and units.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PREPARATION AND TESTING OF VAPOR PHASE CORROSION (Uncl.)

The objective of this project is the preparation and testing of vapor phase corrosion inhibitors which are soluble in oil.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PRELIMINARY EVALUATION OF STRIPPABLE SPRAYABLE PLASTIC COATING COMBINATIONS FOR THE PRESERVATION OF COMPLETE AIRCRAFT FOR LONG TERM STORAGE (Uncl.)

The object of this investigation is to determine, insofar as practicable from laboratory tests, which of the newer formulation combinations, both commercial and experimental, offer the most promise for the long-term storage of large naval aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

INVESTIGATION OF THE ELECTRIC HYGROMETER AS A HUMIDITY INDICATOR (Uncl.)

The objective is to evaluate the electric hygrometer packed into the package for possible use for determining the relative humidity in an actual package of material in storage, and as a control unit for dynamic dehumidification system.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF ENGINE PRESERVATIVE OIL, FILM STRUCTURE (Uncl.)

The objective is to investigate the possibilities of enhancing the stability of thin films of preservative oil.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

SOFT FILM, HIGH MELTING POINT COMPOUND (Uncl.)

A transparent thin film preservative compound that will give satisfactory outdoor exposure protection characteristics and yet be easily removable with petroleum solvents.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

CORROSION PREVENTIVE, AIRCRAFT ENGINE COMPOUND (Uncl.)

The objective is to develop products designed to give improved preservative characteristics in aircraft engines under extended drain-off conditions and the establishment of technical requirements for a proposed specification for this type of material.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PRESERVATION OF HULL BOTTOMS WITH LANOLIN AND BEESWAX MIXTURE (Uncl.)

The objective of this project is to determine the physical and chemical properties of lanolin and beeswax used for the preservation of seaplane hull bottoms by the Naval Air Transport Service.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

CORRELATION OF SALT SPRAY AND HIGH HUMIDITY EXPOSURE TESTS OF CORROSION PREVENTIVE COMPOUNDS WITH THE AIR MATERIEL COMMAND (Uncl.)

The objective is to establish the limits of variation in results on identical preservative materials at the Naval Air Experimental Station and Air Materiel Command.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION AND DEVELOPMENT OF PRESERVATION AND PACKAGING MATERIALS AND METHODS FOR CUSHIONING AERONAUTICAL PARTS AND EQUIPMENT PACKED FOR AIR AND SURFACE SHIPMENT (Uncl.)

The objective is to develop the necessary scientific data for engineering approach to the problem of designing cushioning for packaging aeronautical items to prevent damage during shipment and storage.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PRESERVATION OF PARTS AND EQUIPMENT IN EXTENDED STORAGE (Uncl.)

The objective is to determine, through proper instrumentation of storage containers and periodic observation of the condition of materials stored therein, the storage life under known conditions of aircraft materials and components.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PREPARATION OF ORGANIC CHEMICALS WITH CORROSION INHIBITING PROPERTIES (Uncl.)

The objective of this project is to prepare pure organic chemicals with corrosion inhibiting properties.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: University of Maryland, College Park, Md.

METHODS OF DETERMINATION OF MOISTURE VAPOR TRANSMISSION RATES (Uncl.)

The objective is to establish a scientifically reproducible method of measurement of moisture vapor transmission rates, which will not require excessively costly equipment or especially trained personnel.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF UNIFORM METHOD FOR RECORDING VISIBLE DETERIORATION OF AIRCRAFT MATERIALS (Uncl.)

The object of this project is to develop a suitable and practical standard method for use throughout the naval organization in making visible records of the deterioration on aircraft materials to be used for report purposes.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

COCOON TYPE MOISTURE BARRIER FOR AIRCRAFT ENGINES (Uncl.)

This project covers the development and laboratory testing of cocooning materials and methods as moisture vapor barriers and methods in the preservation of aircraft engines in shipment and/or storage.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

CORRELATION OF SALT SPRAY AND HIGH HUMIDITY TESTS WITH NAVAL AIR EXPERIMENTAL STATION (Uncl.)

The evaluation of approved corrosion protective compounds is being conducted by both Naval Air Experimental Station and U. S. Air Force to determine the correlation which may be obtained in salt spray and high humidity tests.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

INVESTIGATION AND EVALUATION OF SALICYLATES AS POTENTIAL FUNGICIDES FOR AIRCRAFT MATERIALS (Uncl.)

This project being carried out under National Research Council as part of an organized program. The U. S. Air Force portion of this program, as covered by subject project, is concerned with the evaluation of salicylates as potential fungicides.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DEVELOPMENT OF SUITABLE INTERIOR COATINGS FOR METAL CONTAINERS FOR PACKAGING CORROSIVE MATERIALS (Uncl.)

This project covers the development of interior coatings resistant to sodium thio-sulphate (hypo) during shipment and/or storage under climatic conditions of high humidity and temperatures above the critical point (118° F).

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DEVELOPMENT OF A PERMANENT CORROSION PREVENTIVE ADDITIVE FOR LUBRICATING OIL (Uncl.)

The purpose of this project is to develop a permanent corrosion preventive compound for incorporation into lubricating oil for engine operation in service activities being carried out in cooperation with Bureau of Aeronautics, Navy Department.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DEVELOPMENT OF A SUPERIOR STORAGE CORROSION PREVENTIVE COMPOUND (Uncl.)

The purpose of this project is to develop a permanent compound for prevention of corrosion in the storage of aircraft engines.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

INVESTIGATION OF THE EFFECTS OF ACTINIC RADIATION ON EXPERIMENTAL FABRICS (Uncl.)

The purpose of this project is to determine the effect of actinic rays on the degradation of aircraft materials and to attempt to obtain correlation with laboratory sunlight exposure machines.

Sponsored by: U. S. Air Force
Conducted by: New Mexico State College

HOT DIPPING (STRIPPABLE FILM) COMPOUNDS (Uncl.)

The use of hot-dipping strippable protective compounds (Specification JAN-C-149) has valuable use in the packaging of ordnance material, especially where visibility of the part is desirable or where, on arrival at its destination, it is removed from the original exterior package and placed in a bin or on a shelf. Work is in progress to achieve this objective.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Army Proving Grounds

DEHUMIDIFYING PLUGS FOR PRESERVATION OF HYDRAULIC SYSTEMS (Uncl.)

Evaluate uses of dehumidifying plugs for preservation of hydraulic systems and determine the required amount of desiccant for receiver regulators in storage.

Sponsored by: Navy Bureau of Ordnance
Conducted by: Naval Gun Factory

TROPICALIZATION OF ENGINEERING MATERIAL AND EQUIPMENT (Res.)

The purpose of this project is to develop satisfactory treatments for field, depot, and factory application to render the following Corps of Engineers material and equipment resistant to tropical deterioration: electrical and electronic equipment, paints and protective coatings, fabrics, glass in optical instruments, cork, leather, wood, plastics, and natural and synthetic rubber.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

MILDEWPROOFING AGENTS (Res.)

Studies are being conducted to determine the fermentation mechanism of various fungi in different atmospheres.

Sponsored by: Army Chemical Corps
Conducted by: University of Michigan

FUNGUS-PROOFING TREATMENTS FOR QUARTERMASTER ITEMS (Uncl.)

To develop improved fungicides, fungicidal formulations, chemical and biological standards for toxicants, and adequate analytical procedures for evaluating concentrations of toxicants and related materials in formulations.

Sponsored by: Office of Quartermaster General
Conducted by: General Laboratories, Philadelphia Quartermaster Depot, and General Laboratories, Jeffersonville Quartermaster Depot

RUBBER, RUBBER CEMENTS, AND SEALING COMPOUNDS

REVISION OF RUBBER-FOAMED SPONGE SPECIFICATION AN-R-23a (Uncl.)

To determine foam and sponge forming properties to enable use for a wide range of cushioning.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PREPARATION OF SPECIFICATION FOR GLAZING COMPOUNDS (Uncl.)

Conduct additional tests of odor, plasticity and adhesion on glazing compounds to evaluate their use as cabin sealants. If adaptable include both glazing and sealing compounds in one specification having suitable requirements.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF WEATHER RESISTANCE OF SYNTHETIC RUBBERS (Uncl.)

The objective is to establish the weather resistance of synthetic rubbers for the purpose of incorporating suitable requirements in specifications.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DEVELOPMENT OF SILICONE RUBBER COMPOUNDS OF IMPROVED PHYSICAL PROPERTIES (Uncl.)

The objective is to increase the strength and set resistance of silicone rubber without seriously affecting its high and low temperature properties.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

DETERIORATION OF RUBBER ITEMS ON AIRCRAFT IN STORAGE AT LITCHFIELD PARK, ARIZONA (Uncl.)

The objective of this project is the determination of the useful life and rate of deterioration of rubber products installed on inactive aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

DETERIORATION OF RUBBER ITEMS IN STORAGE AT AVIATION SUPPLY OFFICE (Uncl.)

The objective of the test is to determine the rate of deterioration of self-sealing fuel cells stored in supply depots in order to establish the length of time they may be stored and still be usuable.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF EFFECT OF IMMERSING SYNTHETIC RUBBER IN VARIOUS FLUIDS (Uncl.)

The objective is to study effects of various aircraft fluids on synthetic rubbers and recommend uses for which the rubbers are suitable.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

CORROSION ACCELERATION PROPERTIES OF SYNTHETIC RUBBER (Uncl.)

The objective is the establishment of the effect of rubber formulations on the rate of corrosion of aircraft materials.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF LOW TEMPERATURE PROPERTIES OF SYNTHETIC RUBBER (Uncl.)

The objective is to investigate the low temperature properties of various synthetic rubbers and develop test requirements more consistent with the functions of the materials at low temperatures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

CORRELATION OF INTEGRAL FUEL TANK SEALING COMPOUNDS (Uncl.)

The objective is the evaluation of commercially available elastomeric sealing compounds for the purpose of procuring an improved integral fuel tank sealant.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EVALUATION OF SURFACE APPLIED RUBBER PRESERVATIVES (Uncl.)

The objective of this project is to develop a surface applied rubber preservative which will extend service and storage life of items fabricated from rubber.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

METHODS FOR TESTING ELASTOMERIC MATERIALS (Uncl.)

The objective of this project is to provide improved test methods for rubber products.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

WATER DISPERSED THIOKOL INTEGRAL FUEL TANK SEALANTS (Uncl.)

The objective is to prepare a specification for water dispersed Thiokol integral fuel tank sealants.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

FIRE HOSE, $1\frac{1}{2}$-INCH, $2\frac{1}{2}$-INCH, AND $3\frac{1}{2}$-INCH SIZES (Uncl.)

To develop an improved fire hose in $1\frac{1}{2}$-inch, $2\frac{1}{2}$-inch, and $3\frac{1}{2}$-inch sizes for military use in regions and under conditions in which standard commercial hose is not suitable. The hose shall be resistant to attack by fungi prevalent in temperate and tropical climates; shall be flexible at ambient atmospheric temperatures as low as -70° F and shall not become sticky at temperatures as high as 150° F; shall be resistant to deterioration from contact with hydrocarbon compounds such as gasoline and oil.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

DEVELOPMENT OF IMPROVED METHODS AND MATERIALS FOR SEALING AIRCRAFT INTEGRAL TANKS (Uncl.)

To investigate and evaluate materials, designs, and articles submitted by the industry and to conduct tests necessary to establish requirements and determine the suitability of new methods and materials.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DEVELOPMENT OF SYNTHETIC POLYMERS AND COMPOUNDS (Uncl.)

The U. S. Air Force portion of this project is concerned with the development and improvement of hydraulic packing materials.

Sponsored by: U. S. Air Force
Conducted by: Battelle Memorial Institute

COMPOUNDING OF RUBBER-LIKE MATERIALS (Uncl.)

This project is concerned with the compounding of rubber and rubber-like materials for specific applications, such as packing material for hydraulic jacks, acid resistance stocks for rocket seals, ozone resistant stocks for weather stripping, and so forth.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DEVELOPMENT OF SELF-SEALING FUEL TANK LINER (Uncl.)

The purpose of this project is to develop a liner in accordance with Specification AN-T-49, which shall be seamless, flexible at -50° F, and equivalent in ozone resistance to fitting compounds.

Sponsored by: U. S. Air Force
Conducted by: United States Rubber Company

AGING OF RUBBER (Uncl.)

The bulk of the material available in this field deals with methods of testing and artificial aging and is inadequate for prediction of behavior of vulcanized rubbers under specified conditions of long term storage. Development of suitable tests for prediction of aging behavior of rubbers is necessary to permit preparation of specifications insuring procurement of rubbers having maximum storage life.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Rock Island Arsenal

RUBBER AND SYNTHETIC RUBBER RESEARCH (Uncl.)

The objective of this work is the development of special compounds for particular applications, the study of rubber and synthetic rubber as a material, the development and evaluation of methods of tests, and the fabrication of experimental rubber items. Compounding studies are made for development of special use rubber.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

COAXIAL CABLE FOR LOW TEMPERATURE USE (Uncl.)

Work is being directed toward the development of a rubber compound to meet the requirements of Specification JAN-C-17A which will retain its flexibility at -55° C and which will be noncontaminating to the primary insulation, polyethylene.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Federal Telecommunications Laboratory

LOW TEMPERATURE RUBBER (Uncl.)

Research toward the development of a low temperature flexible rubber-like material which will retain its flexibility at -55° C; is intended for both electrical and mechanical uses; must withstand 200° C.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Interchemical Corporation

ELASTOMERS SUITABLE AT HIGH AND LOW TEMPERATURES (Uncl.)

This project is a study of the effect of structure and method of polymerization on the physical characteristics of the resulting elastomers. Emulsion and ionic polymerization of butadiene and alkyl substituted derivatives of butadiene are to be studied. The aluminum chloride and etherated boron trifluoride polymerization of isobutylene with vinyl isobutyl ether are also to be investigated, and new polyamides are to be prepared. The objective of this project is to obtain elastomers with improved high and low temperature characteristics.

Sponsored by: Office of Naval Research
Conducted by: Polytechnic Institute of Brooklyn

STRUCTURE OF HIGH POLYMERS (Uncl.)

Basic research is being conducted on rubber and plastics and a study of high polymers is being made by preparing rubber vulcanizates of known structures. The purpose is to gain a better knowledge of the structure of high polymers in order to develop materials of better quality, particularly at high and low temperatures. Physical properties such as strength, flexibility, plastic flow under various conditions, dimensional recovery, and resistance to solvents are included in this study.

Sponsored by: Office of Naval Research
Conducted by: Goodyear Tire & Rubber Co., Akron, Ohio

METALS IN PLASTICS (Uncl.)

This project is an investigation of plastics prepared by the polymerization of metal-containing monomers. The synthesis of unsaturated organic molecules containing metals is to be attempted.

Sponsored by: Office of Naval Research
Conducted by: Cornell Aeronautical Laboratory

DYNAMIC PROBLEMS OF RUBBER-LIKE MATERIALS (Uncl.)

The purpose of this study is to further our knowledge of the physical and electrical properties of synthetic rubber. An investigation will be made of the nature of mechanical losses in rubber-like materials and of the dynamic properties of such materials.

Sponsored by: Office of Naval Research
Conducted by: University of Notre Dame

SANDWICH CONSTRUCTION

DEVELOPMENT OF VIBRATIONAL INSPECTION METHOD FOR SANDWICH CONSTRUCTIONS (Uncl.)

The objective of this project is the development of a practical nondestructive, vibrational method of inspection for locating defective bonds in sandwich constructions, such as Metalite.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

EFFECT OF ELEVATED TEMPERATURES ON STRENGTH OF METALITE (Uncl.)

The objective of this project is to determine the effect of elevated temperatures on certain strength properties of Metalite sandwich construction.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EVALUATION OF LOW DENSITY CORE MATERIALS FOR SANDWICH CONSTRUCTIONS (Uncl.)

To evaluate and to promote the development of lighter, stronger, and more durable core materials for sandwich constructions.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

EVALUATION OF METALITE PROCESS AND INSPECTION CONTROL (Uncl.)

The objective of this project is to evaluate the process and inspection methods employed in the fabrication of Metalite sandwich panels.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

DESIGN AND TESTS OF PANELS OF SANDWICH TYPE (Uncl.)

To determine most promising materials for use in sandwich construction. To provide data which may be used by designers in designing sandwich type structures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

INVESTIGATION OF FIBERGLAS LAMINATE (Uncl.)

To determine the most promising type of Fiberglas laminates. To provide design data for use in design of sandwich construction utilizing Fiberglas facing.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

EVALUATION OF COMPOSITE STRUCTURES (Uncl.)

To determine if any appreciable advantage is obtained by composite constructions. To determine design data and develop methods of computing strength for composite construction.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

INVESTIGATION OF BEHAVIOR OF SANDWICH STRUCTURES UNDER REPEATED LOAD AND VIBRATION CONDITIONS AT LOW TEMPERATURES (Uncl.)

To determine the behavior of Metalite structure under repeated load and vibration conditions at the low temperatures expected in arctic operations. To acquire data on behavior of sandwich construction, including various core materials and adhesives, to assist in the development of sandwich construction suitable for use at subnormal temperatures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

DESIGN, CONSTRUCTION, AND TESTS OF FIBERGLAS FINS AND RUDDERS (Uncl.)

Acquire data which will permit the design of such surfaces for other aircraft, including guided missiles and pilotless aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Chance Vought Aircraft Division

SERVICE TESTS OF METALITE STABILIZERS (Uncl.)

To determine service characteristics of Metalite stabilizers installed on model F4U-4 airplanes, where service is essentially land-based. To determine over-all service characteristics of Metalite structures on naval aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Station, Jacksonville, Fla.

SERVICE TESTS OF METALITE STABILIZERS (Uncl.)

To determine service characteristics of Metalite stabilizers installed on model F4U-1 and F4U-4 airplanes, where service is essentially fleet operations. To determine over-all service characteristics of Metalite structures on naval aircraft.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Commander Air Force Pacific Fleet

DETERMINATION OF DIRECTIONAL STRENGTH PROPERTIES OF FIBERGLAS LAMINATE (Uncl.)

To obtain data for use in design of Fiberglas sandwich construction, this construction being particularly useful for radar and radio antenna housings where such housings are also a part of the airplane structure. To obtain basic information which will permit design of plastic structures.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Brooklyn Polytechnic Institute

METAL FACED SANDWICH STABILIZER FOR AT-6 (Uncl.)

To investigate and evaluate metal faced sandwich construction using glass fiber honeycomb core and cellular hard rubber core.

Sponsored by: U. S. Air Force
Conducted by: Goodyear Aircraft Corp.

P-80 METAL FACED SANDWICH WING (Uncl.)

To investigate and develop metal sandwich construction and to determine its efficiency and suitability as applied to primary aircraft structures.

Sponsored by: U. S. Air Force
Conducted by: East Coast Aeronautics, Inc.

FILLER OF LOW DENSITY MATERIAL FOR HOLLOW STEEL PROPELLER BLADES (Uncl.)

This project consists of study and tests of low density materials to determine their suitability for use in filling hollow-steel propeller blades to reduce vibrations of the blade walls. The physical and chemical properties of various materials are being investigated.

Sponsored by: U. S. Air Force
Conducted by: Battelle Memorial Institute

MECHANICAL PROPERTIES AT ELEVATED TEMPERATURES OF SANDWICH CONSTRUCTION (Uncl.)

This project covers the determination of the tensile, compressive, and shear stress-strain and strength properties, and stress-rupture and creep characteristics of sandwich constructions and their component materials, at elevated temperatures up to about 600° F.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

P-61 TAIL BOOMS OF METAL-FACE SANDWICH CONSTRUCTION (Uncl.)

To determine from tests the suitability of this type of construction for P-61 series airplanes.

Sponsored by: U. S. Air Force
Conducted by: Fairchild Engine & Airplane Corp.

SHEAR CREEP INVESTIGATION OF PLASTIC SANDWICH CONSTRUCTION MATERIALS FOR RADOMES (Uncl.)

An investigation of the creep of plastic sandwich constructions made with several types of core materials loaded with the core in shear at room temperature.

Sponsored by: U. S. Air Force
Conducted by: Forest Products Laboratory, Madison, Wis.

BT-15 PLASTIC AFT-FUSELAGE SECTION (Uncl.)

To evaluate honeycomb type of sandwich construction in laboratory and service tests.

Sponsored by: U. S. Air Force
Conducted by: Libbey-Owens Ford Glass Co.

FLOORING TEST PROGRAM (Uncl.)

To obtain experimental results on new types of cargo floors which are comparable to results already obtained in the floors in current use.

Sponsored by: U. S. Air Force
Conducted by: Forest Products Laboratory, Madison, Wis.

AT-6 PLASTIC SANDWICH WING PANEL (Uncl.)

To establish the practicability of reproducing plastic structural components from specifications and drawings of equal strength as the original design and to determine by service test the suitability of sandwich design and the structural plastic materials employed therein.

Sponsored by: U. S. Air Force
Conducted by: East Coast Aeronautics, Inc.

EFFECT OF DEFECTIVE AREAS ON THE STRENGTH PROPERTIES OF SANDWICH PANELS (Uncl.)

In the commercial production of sandwich panels it has proved impractical to produce in quantity sandwich structures in which all areas are perfectly bonded. Consequently, it has been necessary to accept items that have not been perfectly made. The effect of these defective areas upon the strength properties of the sandwich panels has not been known. In order to determine this and to determine whether or not the defectively bonded areas increase in size under test, sandwich units that will include defectively bonded areas varying in size and distribution will be manufactured experimentally and tested.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DURABILITY OF LOW DENSITY CORES AND SANDWICH CONSTRUCTION (Uncl.)

A continuing study is in progress to determine improved fabrication methods for sandwich constructions and to evaluate possible materials for use as cores and facings. Investigations were initiated in 1944 to determine the durability of three core materials (balsa, synthetic rubber, and cellular cellulose acetate) and nine sandwich constructions (plywood, aluminum, and glass-cloth faces in combination with balsa, rubber, and cellulose acetate core - all constructions bonded with one adhesive and one laminating resin) when subjected to several different conditions of exposure. The results of the initial tests have been reported.

To continue this project tests are made of new combinations of cores and face materials and of new gluing procedures as they are developed. Exposure tests are now in progress.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DETERMINATION OF DESIGN CRITERIA FOR THE CRITICAL STRESS OF FLAT SANDWICH PANELS SUBJECTED TO TENSION OR COMPRESSION COMBINED WITH SHEAR (Uncl.)

Panels of sandwich construction may become elastically unstable when subjected to edgewise tension or compression combined with edgewise shear. The stress at which buckling takes place depends upon the ratio of the direct stress to the shear stress as well as upon the mechanical properties and thicknesses of the core and facings of the sandwich.

It is proposed to obtain design criteria for such panels by means of mathematical analysis and express the results in the form of curves which can readily be used for design purposes.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

THE DETERMINATION OF THE CRITICAL STRESS AND STRENGTH OF FLAT PLATES OF SANDWICH CONSTRUCTIONS SUBJECTED TO SHEAR (Uncl.)

The effect of transverse shear strains upon the critical stresses of plates subjected to edgewise shear loads is usually so small that it has been neglected in the determination of these stresses in isotropic and plywood plates. In sandwich plates, however, this effect may be large due to the low modulus of rigidity of the core materials usually employed. Thus the critical stresses of sandwich plates are likely to be lower than those computed by the usual methods.

THE DETERMINATION OF THE CRITICAL STRESS AND STRENGTH OF FLAT PLATES OF SANDWICH CONSTRUCTIONS SUBJECTED TO SHEAR (Uncl.) (Concl.)

It is proposed to make an approximate mathematical analysis of the effect of transverse shear deformations in the cores of sandwich constructions upon the critical stresses of those constructions and to verify the results of the analysis by test.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

EVALUATION OF THE BETTER ADHESIVES FOR BONDING METAL AND GLASS-LAMINATE FACES TO SANDWICH CORE MATERIALS (Uncl.)

From the preliminary examination of newly developed adhesives for metal and plastics it is possible to select the better glues for bonding facings to cores. In order to evaluate these selected adhesives, a more exhaustive investigation will be made. This will include establishing suitable limits of operating or application details for bonding faces to cores and determining the effect upon joint quality of such operating details as method of cleaning metal surface, amount of adhesive spread, precure, assembly period, pressure, and curing conditions.

Sponsored by: Army-Naval-Civil Committee on Aircraft Deisgn Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DETERMINATION OF FATIGUE PROPERTIES OF ASSEMBLED SANDWICH PANELS OF VARIOUS CONSTRUCTIONS (Uncl.)

If plates of sandwich construction have been properly designed so that their facings are elastically stable under the loads to which they are subjected, the only important stresses to which the cores are subjected are transverse shear stresses. The consideration of the effect of repeated transverse shear stresses upon the material of the cores and upon the bonds between the cores and the facings is, therefore, important.

It is proposed to determine the shear fatigue characteristics of core materials, and of their bonds to various facing materials.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DETERMINATION OF THE PROPERTIES OF COMMERCIAL HONEYCOMB CORE MATERIALS OF VARIOUS CELL SIZES (Uncl.)

Commercially available honeycomb core materials for use in sandwich constructions are made of cotton cloth, paper, and Fiberglas laminates in cell sizes of $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{3}{8}$ inches. It is proposed to determine the mechanical properties of these materials and of any new materials that may become commercially available.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

INVESTIGATION OF THE ELASTIC STABILITY OF THE FACINGS OF FLAT SANDWICH PANELS SUBJECTED TO COMBINED EDGEWISE STRESS (Uncl.)

Panels of sandwich construction are often required to withstand simultaneously edgewise loads in two different directions. The facings of such panels may act individually as elastically supported plates subjected to edgewise stresses and fail because of instability.

It is proposed to determine design criteria for the determination of the stresses at which instability of the facings occurs. These stresses will be expressed in terms of the mechanical properties and the thicknesses of the cores and facings.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DETERMINATION OF THE OPTIMUM CELL SIZE FOR HONEYCOMB CORE MATERIALS IN COMBINATION WITH FACINGS OF VARIOUS MATERIALS AND THICKNESSES (Uncl.)

One of the functions of a core in a sandwich construction is to inhibit the deflections of the facings so that they will be elastically stable under the desired load. Cores of the honeycomb type are fixed to the facings only at the ends of the cell walls and do not restrain the facings at other points. The unsupported parts of the facings may act as individual plates supported at their edges and, therefore, may become elastically unstable before the desired load is reached. Moreover, lightweight honeycomb core materials are more easily manufactured if the cell size is large rather than small. It is advantageous, therefore, to employ a core material having the largest cell size consistent with stabilization of the facings.

DETERMINATION OF THE OPTIMUM CELL SIZE FOR HONEYCOMB CORE MATERIALS IN COMBINATION WITH FACINGS OF VARIOUS MATERIALS AND THICKNESSES (Uncl.) (Concl.)

It is proposed to investigate the effect of cell size of honeycomb cores upon the stability of facings of various materials and thicknesses and to devise criteria for the determination of the optimum size.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DETERMINATION OF THE SHEAR BUCKLING STRENGTHS OF CURVED PANELS OF SANDWICH CONSTRUCTION (Uncl.)

The present methods for the determination of the buckling stresses of curved plates (of isotropic materials or plywood) are not applicable to all sandwich plates because they do not take into account the effect of stresses greater than the proportional limit of the facing materials nor of the effect of transverse shear stresses in the cores of sandwiches.

It is proposed to modify the present methods to include these two effects and to verify the modified method by tests.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

DETERMINATION OF THE EFFECT OF WIDTH OF SPECIMEN UPON THE BUCKLING STRESSES OF CURVED PLATES OF SANDWICH CONSTRUCTION IN AXIAL COMPRESSION (Uncl.)

An approximate method for the determination of the buckling stresses of curved sandwich plates subjected to axial compression has been devised. Tests indicate that this method is adequate except for those plates in which high transverse shear stresses are developed during buckling.

It is proposed to modify this method to take into account the effect of the modulus of rigidity of the core material and to verify the modified method by tests.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

TO DETERMINE THE STRENGTH OF PLATES OF SANDWICH CONSTRUCTIONS SUBJECTED TO UNIFORMLY DISTRIBUTED LOADS NORMAL TO THEIR SURFACES (Uncl.)

When plates of sandwich construction are supported at their edges and subjected to uniformly distributed loads applied normally to their surfaces, their facings may fail due to bending stresses or their cores may fail due to shear stresses. Prior to failure the plates are forced to assume compound curvatures such that the bending stresses are maximum at their centers and the shear stress maximum at their edges.

It is proposed to correlate the stresses at failure, both bending and shear, in sandwich plates with the mechanical properties and thicknesses of the cores and facings of sandwich constructions.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria

Conducted by: Forest Products Laboratory, Madison, Wis.

THE DETERMINATION OF DESIGN CRITERIA OF SANDWICH CONSTRUCTIONS SUBJECTED TO EDGEWISE COMPRESSION (Uncl.)

If a strip of sandwich construction is loaded as a short column, it will fail in one of four ways: (1) the material of the facings will fail in direct compression; (2) the facings will act individually as elastically supported columns and fail because of instability; (3) lack of perfect flatness of the facings will cause them to deflect under the load, thus subjecting the core to normal loads and resulting in failure in the core or in the bond between it and the facings; and (4) lack of flatness of the sandwich construction will cause it to deflect as a whole, thus subjecting the core to shear stresses with consequent failure.

The strength for the first type of failure can readily be computed if the compressive strength and thickness of the facing material are known. An investigation of the second type of failure, which will yield proper design criteria, is under way and nearing completion. A mathematical analysis of the third type of failure has been made, but it has not yet been verified by test. An investigation of the fourth type of failure has been planned but is not yet under way.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria

Conducted by: Forest Products Laboratory, Madison, Wis.

REPAIR OF SANDWICH CONSTRUCTION USING PORTABLE UNITS EMPLOYING HIGH-FREQUENCY CIRCUITS (Uncl.)

The adhesives used to bond facing materials to the cores in sandwich constructions are ordinarily cured by the application of heat. One recently developed method is the use of high-frequency circuits, by which heating is obtained by the passage of a high-frequency electrical current through the adhesive and the surrounding wood. The use of such high-frequency circuits to hasten the cure of resins offers promise of effecting a saving of time in the repair of sandwich constructions because it affords a means of applying heat to a local area. The application of portable high-frequency apparatus to the repair of sandwich structures will be investigated. The study will include the repair of areas of glass fabric sandwiches by high-frequency curing.

Sponsored by: Army-Naval-Civil Committee on Aircraft Design Criteria
Conducted by: Forest Products Laboratory, Madison, Wis.

STUDY OF SANDWICH PANEL MATERIALS (Uncl.)

One objective of the present study is to gain a better understanding of the sandwich panel as a structural system. Theoretical analysis will be made of the relationship between the strength properties of the panel and the fundamental mechanical properties of the core and face material. Tests will be carried out on various panels.

Another objective is the development of new synthetic materials, especially for the cores. Promising materials which require much additional study are the low density foam materials. Work on these will be carried out by the high polymer group.

Sponsored by: Office of Naval Research
Conducted by: Polytechnic Institute of Brooklyn

STRESS CONCENTRATIONS IN NONISOTROPIC MATERIALS (Uncl.)

To study stress concentrations for the purpose of developing principles for calculating the maximum stress and the distribution of stress at holes, notches, angles, and other stress risers, as a basis for establishing safe and efficient design criteria applicable to nonisotropic materials including sandwich constructions.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: Forest Products Laboratory, Madison, Wis.

LOW DENSITY SANDWICH CORE MATERIALS (Uncl.)

The purpose of this investigation is to evaluate the factors affecting the properties of cellular core materials so as to develop the most efficient performance of honeycomb-core sandwich structures.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: Forest Products Laboratory

STATIC DESTRUCTION TESTS OF METALITE STABILIZERS AFTER SERVICE USE (Uncl.)

To obtain strength and rigidity data on Metalite stabilizers after service use.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Chance Vought Aircraft

EVALUATION OF METAL SANDWICH CONSTRUCTION (Uncl.)

The evaluation of all-metal sandwich and determination of design data for this type of construction.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: California Institute of Technology

SURFACE TREATMENTS

INVESTIGATION OF COATINGS PRODUCED BY ELECTROPHORESIS (Uncl.)

The objective of this project is the development of techniques for deposition of metals and nonmetallics by electrophoresis and the investigation of the effect of deposition techniques on the characteristics of the coatings.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EFFECT OF CHROMIUM PLATING ON THE FATIGUE PROPERTIES OF STEEL (Uncl.)

The objective of this project is the determination of the effect of chromium plating on the fatigue properties of steel and the effect of post-plating heat treatment on the endurance limit.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

INVESTIGATION OF OXIDES ON ALUMINUM ALLOYS FORMED IN FUSED SALT BATHS (Uncl.)

The objective of this project is the investigation of a series of heat treating bath compositions and a series of aluminum alloys heat treated in the several baths to determine the character of the oxide coating formed, the corrosion resistance of the aluminum alloy so coated, and the effect of the oxide coating in promoting paint adhesion.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

BONDERITE SURFACE TREATMENT FOR ALUMINUM ALLOYS (Uncl.)

The objective of this project is to determine the effectiveness of the Bonderite 170 process in improving the corrosion resistance of an adhesion of organic finishes to 24S-T aluminum alloy.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

CORROSION TESTS OF SOME MAGNESIUM LITHIUM BASE ALLOYS (Res.)

The objective of this project is to furnish data on the corrosion resistance of some magnesium-lithium base alloys and to indicate any microconstituents which may be found undesirable from the point of view of corrosion resistance.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

EFFECT OF METALLIC COATINGS ON FAILURE BY REPEATED THERMAL STRESS (Uncl.)

The objectives of this project are: (1) to establish a repeated thermal stress test; (2) to evaluate the effect of high conductivity coatings on high temperature materials and of high temperature coatings on high conductivity materials, and the features of construction on the resistance of materials to failure by repeated thermal stress; and (3) to use data collected to establish general design criteria.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF RESISTANCE OF STRUCTURAL ASSEMBLIES TO CORROSION IN TIDEWATER (Uncl.)

The objective of this project is the evaluation of the corrosion resistance of various materials and assemblies of different materials in atmospheric and tidewater exposure.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

QUALIFICATION OF ALODINE PROCESS FOR COATING ALUMINUM ALLOYS (Uncl.)

The objective of this project is the evaluation of several chemical processes by test against the requirements of the proposed AN specification to determine the comparative merits of the several processes and to compare their performances with proposed specification requirements.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

PLATING OF INTERNAL ENGINE PARTS (Uncl.)

The objective of this project is the evaluation of a coating of 50 percent cadmium - 50 percent tin for prevention of corrosion of internal steel parts of R-1830 and R-1340 radial aircraft engines.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Station, Pensacola, Fla.

INVESTIGATION OF THIN VITREOUS FILMS ON METALS (Uncl.)

The objective of this project is the development of application techniques and evaluation of thin ceramic coatings for prevention of corrosion of metals at temperatures up to 1000° F.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

INVESTIGATION OF EFFECT OF SUPERSONIC OSCILLATION ON ELECTRO-DEPOSITION OF METALS (Uncl.)

The objective of this project is the investigation of the effect of supersonic vibrations on plating processes to determine the effect on hydrogen embrittlement, porosity, and adhesion of the metal deposit and on the physical properties of the basis metal.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

ANODIC TREATMENTS OF MAGNESIUM ALLOYS (Uncl.)

The objective of this project is the comparative evaluation of several anodic treatments for magnesium alloys.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

SALT SPRAY TESTS OF OXIDE COATED CORROSION RESISTING STEELS (Uncl.)

The objective of this project is to evaluate the resistance to corrosion in salt spray tests of three heat treatable corrosion resisting steels after treatment to produce an oxide surface.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: National Bureau of Standards

LOW CONTRACTION CHROMIUM COATINGS (Uncl.)

The objective of this project is to determine the physical, mechanical, chemical, and corrosion preventive properties of low contraction chromium coatings and the effect of the coatings on the physical properties of the basis metal, and to determine the conditions under which the most satisfactory coating is produced.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

TIN-CADMIUM ALLOY COATINGS (Uncl.)

The objective of this project is to determine the physical, mechanical, chemical, and corrosion preventive properties of electroplated cadmium-tin alloy coatings and the effect of the coatings on the physical properties of the basis metal, and to select the most satisfactory alloy composition.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

EXAMINATION OF ANTI-ICING FLUID AND SLUDGE SPECIMENS (Uncl.)

The objective of this project is to determine whether the anti-icing fluid was the cause of corrosion experienced in aluminum alloy tubing of an aircraft anti-icing system and, as contributary information in this respect, to determine the composition and probable source of sludge discharged from the anti-icing system.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

STAINLESS STEEL RIVETS IN CLAD 75S-T ALUMINUM ALLOY (Uncl.)

The objective of this project is to determine the S/N curves for specimens of clad 75S-T riveted with 18-8 stainless steel rivets cadmium plated and unplated both before and after exposure to corrosive conditions.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Material Center

HIGH-REFLECTANCE, NONTARNISHING SURFACES FOR REFLECTORS (Uncl.)

To develop a nontarnishing surface with higher reflectance and greater durability than that of present searchlight reflectors, in order to improve the efficiency of light projection equipment.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

CORROSION RESISTANCE AND PROTECTIVE TREATMENT OF LIGHT METAL ALLOYS (Uncl.)

This project consists of a study of the causes and effects of corrosion on the various basic aluminum and magnesium alloys widely used in aircraft and to develop effective treatments and inhibitors.

Sponsored by: U. S. Air Force
Conducted by: National Bureau of Standards

DEVELOPMENT OF SUBSTITUTES FOR CADMIUM AND ZINC PLATE (Uncl.)

This project is a study of substitutes for cadmium and zinc plate which will provide improved corrosion resistance for steels under severe corrosive conditions.

Sponsored by: U. S. Air Force
Conducted by: Battelle Memorial Institute

ACID PICKLING (Uncl.)

This project is for the purpose of evaluating existing acid inhibitors and to develop new inhibitors for use in hydrochloric acid pickling at room temperature.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Army Proving Grounds

SURFACE PREPARATION OF METALS (FERROUS AND NONFERROUS) (Uncl.)

Improper surface preparation causes many premature paint failures. This project is for the purpose of evaluating methods of surface preparation prior to painting. Tests will continue intermittently in conjunction with other projects.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: American Society for Testing Materials

FINISHES FOR NONFERROUS METALS (Uncl.)

This project has as its purpose the determination of methods of evaluating various nonferrous metal treatments. Tests are being conducted covering magnesium treatments and will continue on all treatments for magnesium and aluminum required for Ordnance use.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Frankford Arsenal

ALODINE ALUMINUM TREATMENT-BONDERITE 170 (Uncl.)

These projects cover investigations of proprietary products to determine their suitability for use on ordnance materiel and to obtain specification requirements.

Sponsored by: Materials Branch, Army Ordnance
Conducted by: Army Proving Grounds

CATHODIC PROTECTION OF STEEL SURFACES (Uncl.)

Zinc and aluminum are being investigated with respect to their ability to produce current in sea water over extended periods of time. The influence of metal composition, exposure conditions, such as temperature and turbulence, and anodic current density are being studied.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

STUDY OF INHIBITIVE PIGMENTS IN PROTECTIVE FILMS ON STEEL SURFACES (Uncl.)

The mechanism by which paint pigments affect the performance of paints is only slightly understood. Since corrosion of steel is an electrochemical process, the electrochemical effects of these pigments on steel are under investigation.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

INVESTIGATION OF CHEMICAL TREATMENTS OF STEEL SURFACES PRIOR TO PAINTING (Uncl.)

To clarify the fundamental aspects of phosphate deposits on steel, this investigation covers the reaction of phosphoric acid and its modified solutions on iron, steel, and the oxides of iron.

Sponsored by: Navy Bureau of Ships
Conducted by: Naval Research Laboratory

SYNTHETIC RESINS, MOLDED AND LAMINATED PLASTICS

General

MOLDING MATERIALS (Uncl.)

To develop and evaluate organic molding materials for use in military items; to improve characteristics, such as water absorption, abrasion resistance, impact strength, and resistance to high and low temperatures as required for military use of the item.

Sponsored by: Office of Quartermaster General
Conducted by: Engineering Associates, St. Charles, Ill.;
Hawley Products Co., St. Charles, Ill.; and
Firestone Tire & Rubber Co., Washington, D. C.

INVESTIGATION OF PLASTICS (Res.)

Various commercial resins and other compounds are being tested for their possible use in Chemical Corps items.

Sponsored by: Army Chemical Corps
Conducted by: Army Chemical Corps, Edgewood Arsenal, Md.

MOLDING AND FABRICATING PLASTICS (Uncl.)

This will involve experimentation with different plastic material, molding technique, laminating, adhesive-bonding, and other fabricating operations.

Sponsored by: Navy Bureau of Ordnance
Conducted by: Naval Ordnance Laboratory

PLASTIC STRIPPABLE FILMS EVALUATION (Uncl.)

This project is being set up to accomplish accelerated aging tests, service evaluation, and specification verification on new formulas of the navy's plastic strippable film 52C41 (INT) formerly (O.S. 3602).

Sponsored by: Navy Bureau of Ordnance
Conducted by: National Bureau of Standards

SOFTENING POINT OF ELASTOMERS (Uncl.)

To adapt the present pressure penetration test for softening point of elastomers to make it more suitable for thin materials.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

PLASTICS (Uncl.)

Research toward the development of improved laminated and molded thermosetting materials; noncrazing polystyrene; improved high temperature thermoplastic material; potting compounds; improved rolled or molded tubes; thermosetting, thermoplastic, varnish materials all with high dielectric constant.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Princeton University

EVALUATION OF PLASTIC LAMINATES FOR SPECIFICATION PURPOSES (Uncl.)

To develop test procedures and test data on a range of thicknesses of 15 types of laminated plastics from all manufacturers to be used in a future revision of Specification JAN-P-13.

Sponsored by: Navy Bureau of Ships
Conducted by: Johns Hopkins University

EFFECT OF HEAT ON TENSION SHRINKAGE OF SYNTHETIC RESIN SHEETS AND TAPES (Uncl.)

To develop a more suitable test method for determining effect of heat on tension shrinkage characteristics of synthetic resin sheets and tapes - for specification purposes.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

IGNITION TEMPERATURE OF PLASTICS (Uncl.)

To develop standardized methods and apparatus for the determination of the ignition temperature of plastic materials used in aircraft.

Sponsored by: U. S. Air Force
Conducted by: National Bureau of Standards

RESEARCH IN NONMETALLIC MATERIALS, PLASTICS AND WOODS (Uncl.)

To investigate and evaluate materials, such as various plastics, of laminate and sandwich construction and different types of wood.

Sponsored by: U. S. Air Force
Conducted by: Forest Products Laboratory, Madison, Wis.

COMPARISON OF PLASTICS TEST PROCEDURES (Uncl.)

This project covers the analysis of variations in the thermal, mechanical, and weather-resistance test data being obtained on various aircraft plastic materials by Air Materiel Command and National Bureau of Standards.

Sponsored by: U. S. Air Force
Conducted by: National Bureau of Standards

DEVELOPMENT OF STRUCTURAL PLASTICS FOR USE ON SUPERSONIC AIRCRAFT AND/OR MISSILES (Uncl.)

To continue the development of nonmetallic materials in order that suitable structures from both an electronic and structural viewpoint will be available for use on transonic, supersonic aircraft and/or missiles.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

C-54 PLASTIC WING SECTION (Uncl.)

Development of an integral antenna for high-speed aircraft and to determine the suitability of plastic materials as applied to the wing structures of a cargo airplane.

Sponsored by: U. S. Air Force
Conducted by: Douglas Aircraft Co., Inc.

NEW PLASTIC MATERIALS (Uncl.)

Evaluate new silicone resin by testing the properties for use in reinforced shipboard plastics, to investigate the most practical type plastic material for sonic crystal mounts, cavity charges for plugs, and insulating ring bases for fuses. Also investigate ethyl cellulose molding compounds applicable to Specification O.S. 1661.

Sponsored by: Navy Bureau of Ordnance
Conducted by: Naval Ordnance Laboratory

WATERPROOF DETONATING CORD (Res.)

Plastic materials are being developed in connection with an attempt to provide a completely waterproof and dependable detonation cord for detonating Corps of Engineers explosive charges under all climatic conditions and in either land or amphibian military operation.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

BUOYANT TOWLINE (Res.)

Plastic materials are being developed for a buoyant towline 3000 feet long containing a sound power telephone line, and capable of towing a 10-man landing boat through a 2-foot sea. The line must be resistant to mildew and rot under tropical conditions and must have maximum resistance to abrasion.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

LANDING MATS, AIRFIELD PLASTIC, 70,000 LB WHEEL LEAD (Uncl.)

The purpose of this project is to develop a transportable airplane landing mat fabricated from laminated plastic material that will sustain for a period of one year, normal operations of military aircraft, having dual wheel load of 70,000 pounds or a tire intensity of 170 psi.

Sponsored by: Office of Chief of Engineers
Conducted by: Engineering, Research & Development Laboratory, Fort Belvoir, Va.

NORMAL PRESSURE TESTS ON PLASTIC MATERIALS FOR RADOMES (Uncl.)

This project covers the fabrication of test apparatus and the determination of the rate of air transmission at various pressures through various plastic materials used for aircraft radomes.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

Glass Fabrics

DESIGN, FABRICATION, AND TESTS OF TWO SETS OF FIBERGLAS AUXILIARY ROTOR BLADES (Uncl.)

The purpose of this project is to determine the strength characteristics of rotor blades of glass-fiber plastic construction. Whirl stand tests and flight tests are in progress.

Sponsored by: U. S. Air Force
Conducted by: Cornell Aeronautical Laboratory

AT-6 PLASTIC HORIZONTAL STABILIZER (Uncl.)

To evaluate design and to determine adaptability and construction of laminated glass fibers bonded with a thermosetting low pressure resin.

Sponsored by: U. S. Air Force
Conducted by: Goodyear Aircraft Corp.

COMPARISON OF PROPERTIES OF GLASS FABRIC (Uncl.)

This project covers the determination of mechanical properties at room and elevated temperatures and after various exposure conditions of glass fabric plastic laminates made with a number of different resins.

Sponsored by: U. S. Air Force
Conducted by: Johns Hopkins University

STRENGTH IMPARTING PROPERTIES OF FIBERS AS REINFORCEMENT OF A POLYESTER RESIN (Uncl.)

In this program the various factors involved in the strengthening of a synthetic resin by various fibers will be investigated from a fundamental point of view. Fibers to be investigated are: cotton, ramie, linen, nylon, cellulose acetate, and fibrous glass, as well as some of the recent metallic fibers. Properties such as flexural strength, compressive strength, abrasion resistance, specific gravity, water absorption, loss of strength at high humidity, and the like will be measured.

Sponsored by: Office of Naval Research
Conducted by: University of Chattanooga

EFFECTS OF FILLERS ON PLASTICS (Uncl.)

Objective of project is to experimentally produce samples of various laminates employing a variety of reinforcing fibers including glass, ramie, and steel, and to conduct tests on such samples to evaluate these effects.

Sponsored by: Navy Bureau of Ships
Conducted by: University of Chattanooga

EVALUATION OF SILICONE GLASS LAMINATES (Uncl.)

To evaluate silicone glass laminates for use as high temperature electrical insulation prior to use for specification purposes and preapplication purposes, by standard methods and by methods suggested by I.T.E. Circuit Breaker Company.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

Insulating Properties

RELATIVE ELECTRICAL AND FLAME RESISTANCE PROPERTIES OF NATURAL AND BLACK PHENOLICS (Uncl.)

To obtain test data on relative electrical and flame resistance properties of natural and black phenolics. Samples to be molded by Material Laboratory, New York Naval Shipyard, from powder to be furnished by four molding powder manufacturers.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

DIELECTRIC LOSS OF SYNTHETIC RESIN FILMS AND TAPES (Uncl.)

To develop a more suitable test method for dielectric loss of synthetic resin films and tapes - for specification purposes.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

INSULATION RESISTANCE OF LAMINATES (Uncl.)

Objective is to investigate various methods and procedures for moisture conditioning type GMG material which may result in an indication of long time performance under conditions of high humidity.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

DIELECTRIC STRENGTH OF MOLDED AND LAMINATED PLASTICS (Uncl.)

To compare various methods of test of parallel and transverse dielectric strength of plastics, using different electrode systems and oil mediums.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

DIELECTRIC LOSS OF ELECTRICAL INSULATION OVER FULL FREQUENCY RANGE (Uncl.)

To develop test methods and evaluate dielectric loss of electrical insulating materials over frequency range from 60 cycles to 30,000 megacycles.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

RESEARCH ON BASIC PROPERTIES OF ELECTRICAL INSULATING MATERIALS (Uncl.)

Fundamental research into electrical applications of plastic materials to improve them. The end result will be more efficient electrical and electronic equipment. The Princeton University staff pursuing this project is being assisted by an advisory group from the American Society for Testing Materials.

Sponsored by: Navy Bureau of Ships
Conducted by: Princeton University

DIELECTRIC STRENGTH OF ELECTRICAL INSULATION AT HIGH FREQUENCIES (Uncl.)

To develop test apparatus, test procedures, and test data for dielectric strength of plastics and other electrical insulating materials at high frequencies.

Sponsored by: Navy Bureau of Ships
Conducted by: Johns Hopkins University

MOLDING PROCEDURES AND EFFECTS ON PROPERTIES (Uncl.)

To determine the relationship of physical and electrical characteristics of molded thermosetting materials and molding procedures employed; a special one piece molded specimen is to be used and the range of molding pressures, temperatures, and times for good molding is to be determined.

Sponsored by: Navy Bureau of Ships
Conducted by: Mare Island Naval Shipyard

EFFECT OF HIGH AND LOW TEMPERATURES, HIGH HUMIDITY, AND WATER ON LAMINATES (Uncl.)

To evaluate and classify laminated plastics by effect of high and low temperatures on physical and electrical properties. Also to evaluate and classify laminated plastics by effect of high humidity and water immersion on physical and electrical properties.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

ARC RESISTANCE OF ELECTRICAL INSULATING MATERIALS (Uncl.)
To develop test methods for arc resistance of electrical insulating materials simulating various types of service.
Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

INSULATION RESISTANCE OF ELASTOMERIC TUBING (Uncl.)
To develop a more suitable test method for insulation resistance of elastomeric tubing for specification purposes.
Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

A-26B PLASTIC ENGINE COWLS (Uncl.)
To investigate and evaluate laminated plastic construction specially treated with an electrically conductive material for the purpose of imparting satisfactory radio shielding properties.
Sponsored by: U. S. Air Force
Conducted by: Goodyear Aircraft Corp.

Mechanical Properties

RAIN EROSION TESTING OF PLASTIC MATERIALS (Uncl.)
This project covers the testing of various aircraft laminated plastic materials for resistance to rain erosion at speeds up to 700 miles per hour, correlating the data with service experience and the development of a suitable laboratory accelerated test apparatus.
Sponsored by: U. S. Air Force
Conducted by: Cornell Research Foundation

RAIN EROSION TESTS OF SOME STRUCTURAL PLASTIC MATERIALS (Uncl.)
This project covers the determination of rain erosion characteristics of several aircraft structural glass fabric, basic, plastic laminates employing a whirl rig.
Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

EFFECT OF OUTDOOR EXPOSURE ON MECHANICAL PROPERTIES FOR PLASTIC MATERIAL (Uncl.)
This project covers the determination of the effect of outdoor exposure on the mechanical properties of aircraft plastic laminated materials.
Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

DETERMINATION OF THE TENSILE PROPERTIES OF SOME NONMETALLIC AIRCRAFT MATERIALS AT VARIOUS SPEEDS OF LOADING (Uncl.)

Determine the effects of speed of loading on the stress-strain and ultimate strength properties in tension of methyl methacrylate, glass fabric, and cotton laminates.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

TENSILE STRENGTH OF THERMOPLASTICS (Uncl.)

The tests authorized will provide data and current methods of test for plastic materials covered in specifications. This will ultimately result in obtaining improved materials in accordance with clearly defined specifications values and test procedures.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

FLEXIBILITY OF THERMOPLASTICS (Uncl.)

To investigate recent methods of test for determining flexibility with a view to elimination of personal error and revision of the specifications to obtain improved material.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

WORKABILITY OF THERMOPLASTICS (Uncl.)

To investigate the effects of drilling, machining, bending, and cutting on various plastic sheets to obtain data and information upon which to base a revision of above mentioned specifications.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

TENSILE AND FLEXURAL CREEP OF LAMINATES (Uncl.)

To develop test apparatus and test methods for tensile and flexural creep of plastic laminates.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

COEFFICIENT OF LINEAR THERMAL EXPANSION OF LAMINATES (Uncl.)

In order to evaluate dimensional stability of plastics under changes in temperature, to develop a suitable method of test for coefficient of linear thermal expansion of laminates.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

WEATHERING OF PLASTICS (Uncl.)

To evaluate action of outdoor weathering on various types of plastics at various naval weathering stations throughout the world.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

ABRASION RESISTANCE OF PLASTICS (Uncl.)

Abrasion resistance of plastic materials as determined quantitatively by laboratory tests is a direct measure of the wear characteristics that can be expected of the plastic material in actual service life. It is important to have this information before plastic materials can be considered in design applications. The end result is a correct utilization of plastics in wear applications.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

DROP BALL IMPACT TESTS ON PLASTICS (Uncl.)

To develop a suitable test method for impact fatigue of plastics by drop ball method.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

SHOCK RESISTANCE OF MOLDED THERMOSETTING STANDARD SPECIMENS (Uncl.)

To develop test methods and evaluate molded thermosetting plastics for flexure, tensile and shear high impact shock resistance, to determine possible correlation with Izod and drop ball impact strength, and to correlate shock tests on standard specimens and molded parts.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

STUDY OF CREEP IN PLASTICS (Uncl.)

Objective of project is to investigate the reasons, magnitude, and other basic factors involved in the creep of the common plastic materials. This investigation will form the basis of future work to build materials in which the undesirable creep characteristics may be minimized.

Sponsored by: Navy Bureau of Ships
Conducted by: Pennsylvania State College

PUNCHING OF LAMINATED PLASTICS (Uncl.)

Objective of project is the development of a simple, convenient, inexpensive tool for use in a specification to enable an inspector to judge the punching properties of laminates as may be required by the specification. Present means, such as defined by ASTM, is too large and expensive for extended use in specification.

Sponsored by: Navy Bureau of Ships
Conducted by: Barnes & Reinecks, Inc.

HIGH IMPACT AND HIGH TENSILE STRENGTH THERMOSETTING PLASTIC (Res.)

Develop and evaluate a high strength low radar reflectancy, low pressure thermosetting plastic, through the studies of interfacial relationships and the improvement of the cohesive properites and chemical affinity of the resin on the fiber surface.

Sponsored by: Navy Bureau of Ordnance
Conducted by: Johns Hopkins University

EFFECT OF VARIABLES IN REINFORCEMENT CONSTRUCTION AND FABRICATION TECHNIQUE ON PROPERTIES OF LAMINATED PLASTICS (Uncl.)

Laminated plastics will be made in which the reinforcement construction, fabrication technique, and resins are varied. Tests will be made to determine the effects of phase variables upon pertinent mechanical properties, including tensile, flexural, and impact strength. The plastic samples will be prepared with the following factors as variables: type of fabric, fabric treatment, orientation of fibers, resin content, and molding conditions.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

TEST AND DEVELOPMENT OF PLASTIC ARMOR FOR FRAGMENT PROTECTION (Uncl.)

The objective is to develop a nonmetallic material of maximum fragment penetration resistance at minimum weight for use in flight clothing, flak curtains, and other applications where resistance to fragment penetration is desired.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Research Laboratory

HIGH STRENGTH PLASTIC LAMINATES (Uncl.)

The objective of this project is to evaluate and develop plastic laminates having the highest possible strength-weight properties for use in radomes, antenna housings and in aircraft applications where high rigidity to weight ratio is of more importance than load carrying capacity.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

Temperature Resistant

COLD TEMPERATURE BRITTLENESS OF ELASTOMERS (Uncl.)

To develop a more suitable test method for the classification of elastomers as to cold temperature brittleness - for specification purposes.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

FLAME RESISTANCE OF SYNTHETIC RESIN MATERIALS (Uncl.)

To develop a more suitable test method for flame resistance of synthetic resin sheets and tapes - for specification purposes.

Sponsored by: Navy Bureau of Ships
Conducted by: New York Naval Shipyard

EFFECT OF TEMPERATURES UP TO 300° C ON FLEXURAL STRENGTH OF HEAT-RESISTANT LAMINATES (Uncl.)

Laminated plastics reinforced with glass fabric and asbestos fillers and bonded with silicone, unsaturated polyester, furane, and phenolic resins, will be obtained commercially in the form of flat sheets. Flexural tests will be made on specimens cut from these samples at temperatures up to 300° C and high enough to cause the flexural strength to drop a fraction of its value at room temperature.

Tests will be made both after short and long conditioning periods, such as one hour and one week, respectively, at the test temperature. Other specimens will be tested at room temperature following prolonged exposure to several elevated temperatures up to 300° C.

Sponsored by: National Advisory Committee for Aeronautics
Conducted by: National Bureau of Standards

FLAME RESISTANT HOSE (Uncl.)

A project to develop a flame resistant fuel and oil hose using metal, glass fabric, or other refractory material.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

HIGH TEMPERATURE MOLDING MATERIAL (Uncl.)

Research toward the development of a material to have a safe continuous operating temperature of 200° C. Material should have other properties equivalent to MIS-E-4 per JAN-P-14 and should be as easily molded as phenolic materials.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Federal Telecommunications Laboratory

TRANSPARENT MATERIALS

EVALUATION OF ELECTRICALLY HEATED GLASS (Uncl.)

The objective of this project is to determine the suitability of electrically heated laminated glass of the continuous transparent conducting film type for use in aircraft windshields for anti-icing and antifogging purposes.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Gun Factory Aviation Ordnance

TEST AND DEVELOPMENT OF IMPROVED TRANSPARENT PLASTIC SHEET (Uncl.)

The objective of this project is to evaluate the suitability of newly developed transparent plastics for use in current and future naval aircraft and to promote the development of improved materials by manufacturers.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

EVALUATION AND DEVELOPMENT OF ACRYLIC PLASTIC SHEET (Uncl.)

The objective of this project is to obtain better materials and methods for use in cleaning, buffing, polishing, and waxing acrylic parts; to ascertain which materials likely to come in contact with acrylic parts in service have deleterious effects and what precautions should be exercised to guard against such effects.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

INVESTIGATION OF TRANSPARENT ACRYLIC SHEET - FORMING STRESSES (Uncl.)

The objective of this project is to establish criteria governing forming techniques for transparent acrylic plastic as necessary to insure that frozen stresses incurred during forming are held at the practical minimum.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

TEST AND DEVELOPMENT OF TRANSPARENT ACRYLIC PLASTIC PARTS - IMPROVED METHODS OF ATTACHMENT (Uncl.)

The objective of this project is to evaluate and develop methods of attachment suitable for use in naval aircraft which are capable of distributing stresses to a high degree of uniformity such that the attachment approximates the strength of the base material with minimum weight penalty.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

INVESTIGATION OF STABILITY OF OPTICALLY IMPROVED BULLET RESISTANT GLASS WINDSHIELDS (Uncl.)

The objective of this project is to determine whether or not the optical quality of bullet-resistant glass ground to wedge angle tolerances of the order of ten seconds is maintained under the thermal conditions encountered in service.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Gun Factory Aviation Ordnance Department

INVESTIGATION AND DEVELOPMENT OF CRITERIA FOR FORMED ACRYLIC PLASTIC SHEET (Uncl.)

The objective of this project is to establish suitable criteria controlling thermal stresses in large curved transparent acrylic parts for use in the design of attachments for such parts.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

IMPROVING OPTICAL QUALITY OF BULLET-RESISTANT GLASS WINDSHIELDS (Uncl.)

The objective of this project is to determine the practicability of producing windshield panels on a production basis with a maximum wedge angle tolerance of the order of ten seconds.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Gun Factory

DEVELOPMENT OF IMPROVED ABRASION TEST METHODS FOR TRANSPARENT PLASTICS (Uncl.)

The objective of this project is to establish reliable abrasion testing procedures for evaluating transparent acrylic sheet and acrylic polishing compounds.

Sponsored by: Navy Bureau of Aeronautics
Conducted by: Naval Air Experimental Station

DEVELOPMENT OF TRANSPARENT PLASTIC INSTALLATIONS IN AIRCRAFT (Uncl.)

To investigate and evaluate materials, design, and articles submitted by the industry and to conduct tests necessary to establish requirements for optical strength and visibility.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

LAMINATED ACRYLIC PLASTIC IN LARGE SHEET FORM (Uncl.)

This project includes the development of production facilities for large size laminated acrylic plastic sheet intended for large bomber aircraft.

Sponsored by: U. S. Air Force
Conducted by: Rohm & Haas Co., Inc.

PREPARE SPECIFICATION REQUIREMENTS FOR TRANSPARENT LAMINATED ACRYLIC PLASTICS (Uncl.)

This project involves the determination of the optical, thermal, and mechanical properties of improved laminated acrylic plastics with the view toward incorporating suitable requirements into a specification for this type of material.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

TEST HEAT DISTORTION OF TRANSPARENT PLASTICS FOR DEFORMATION (Uncl.)

This project covers the establishment of standardized heat distortion test methods for transparent plastics used in aircraft.

Sponsored by: U. S. Air Force
Conducted by: Air Materiel Command

OPTICAL CASTING MATERIAL (Uncl.)

Research toward the development of a plastic material suitable for the casting of precision optical lenses, prisms, and mirrors.

Sponsored by: Signal Corps Engineering Laboratories
Conducted by: Armour Institute

INVESTIGATION OF PROPERTIES OF ELEVEN SAMPLES OF TRANSPARENT PLASTICS FOR GLAZING MATERIALS ON BUSES (Uncl.)

This project consists of a general evaluation of eleven samples of transparent plastics with high impact resistance, for resistance to cleaners, abrasives, and general simulated service tests, for use on side windows of buses.

Sponsored by: National Bureau of Standards
Conducted by: National Bureau of Standards

DEVELOPMENT OF IMPACT RESISTANT WINDSHIELD GLASS (Uncl.)

Collision of airplanes with birds in flight constitutes a serious hazard to flying and with the development of larger aircraft of higher speed the potential hazard associated with such collision is increasing. The development of suitable means for protection of aircraft against collision with birds, with particular regard to the windshield construction is now in progress. This program also includes consideration of windshield de-icing means in the development of impact resistant glass windshield panels.

Sponsored by: Civil Aeronautics Administration
Conducted by: Civil Aeronautics Testing Laboratory, Indianapolis, Ind.

INVESTIGATION ON THE SURFACE REACTIONS OF METHYL METHACRYLATE COPOLYMERS (Uncl.)

Efforts will be made to improve surface hardness by copolymerizing methyl methacrylate with various non-crosslinking monomers. Some of the monomers to be investigated are methacrylic acid, styrene, vinyl acetate, and maleic anhydride. The carboxyl, phenyl, and anhydride groups will react to form a surface that will be an integral part of the object.

Sponsored by: Office of Naval Research
Conducted by: University of Chattanooga

WOOD AND PLYWOOD

DIMENSIONAL STABILIZATION OF WOOD BY CHEMICAL CROSSBONDING (Uncl.)

The purpose of this project is to develop means of forming chemical crossbonds, such as ether and acetal linkages, between cellulose chains and lignin molecules in wood without accompanying carbonization or hydrolysis so as to produce permanent dimensional stabilization without degradation of the wood.

Sponsored by: Office of Naval Research
Conducted by: Forest Products Laboratory, Madison, Wis.

PROPERTIES OF TROPICAL WOODS (Uncl.)

This investigation is directed toward extending our knowledge of the properties of tropical woods. A systematic examination will be made of a series of selected tropical woods that appear to have promise for structural applications. Between 12 and 20 species will be selected for measurement of mechanical properties, specific gravity, shrinkage, durability, machinability, and the seasoning and gluing characteristics.

Sponsored by: Office of Naval Research
Conducted by: Yale University